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ELEVENTH ANNUAL REPORT
 OF THE
SECRETARY
 OF THE
STATE BOARD OF HEALTH
 OF THE
 STATE OF MICHIGAN,

FOR THE
 FISCAL YEAR ENDING SEPTEMBER 30, 1883.



BY AUTHORITY.

LANSING, MICH.

W. S. GEORGE & CO., STATE PRINTERS AND BINDERS.

1884.



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Office of the Secretary of the State Board of Health, }
LANSING, MICHIGAN, *December, 1883.* }

TO HON. JOSIAH W. BEGOLE, *Governor of Michigan:*

SIR:—In compliance with the laws of this State, I present to you the accompanying Report for the fiscal year ending September 30, 1883.

Very respectfully,

HENRY B. BAKER,

Secretary of the State Board of Health.

**RESOLUTION OF THE BOARD RELATIVE TO PAPERS PUBLISHED IN
ITS ANNUAL REPORT.**

***Resolved*, That no papers shall be published in the Annual Report of this Board except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who shall be entitled to the credit of its production, as well as responsible for the statements of facts and opinions expressed therein.**

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printed on pages 81–83, in connection with a summary of reports of communicable diseases during the year ending September 30, 1883. A special warning relative to small-pox, Circular 62, is printed on page 104.

IMMIGRANT INSPECTION.

While the immigrant-inspection service was continued, weekly reports of inspections were received from the inspectors. A compilation of the reports, with a summary for the whole period the inspections were in force, is printed on pages 31–44.

DISEASES IN MICHIGAN IN 1882.

A compilation of replies by 27 correspondents to Circular 59, relative to diseases in Michigan in 1882 is printed, with the replies, on pages 1–28.

WEEKLY REPORT OF DISEASES IN 1882.

A list of observers for the calendar year 1882 is printed on pages 218, 219, 222. A compilation of reports, with a study of relations of sickness to climatic conditions is printed on pages 197–248. The following circular has been used in asking for reports by health officers of villages:

[61.]

OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH, }
Lansing, Mich., 188..... }

Dr., *Health Officer of the Village.*

DEAR SIR,—For several years the State Board of Health has received from regular correspondents and health officers of cities, on postal blanks supplied from this office, weekly reports of diseases. For 1882 such reports were also received from a number of health officers of villages. From these reports there is prepared each year, for publication in the Annual Report of the Board, a statistical report of sickness during the year, for study in connection with reports of meteorological conditions. There is also prepared each week, and published in a large number of newspapers in the State, a bulletin of sickness during the preceding week. In order to have these bulletins completely represent the State, it is desirable that as many of the reports as possible should be received immediately after the close of the week.

I enclose a copy of a recent bulletin, with one of the blank postals on which the reports are made, a sample page of the record-book supplied to observers, and a printed letter fully stating the plan of marking the reports. I would be glad to know whether, if blanks were sent, you would be willing to make such weekly reports. The State Board of Health has no funds from which to pay for the reports, but relies for the desired information largely on the generous interest in public-health subjects of physicians and local boards of health. It is proper, however, for the health officer to receive from his board of health compensation for his services in making reports to the State Board of Health.

A stamped envelope is enclosed for your reply.

Very respectfully,

HENRY B. BAKER, *Secretary.*

HEALTH BULLETINS.

The weekly reports of diseases received up to Wednesday of the week following the week for which they are made, are compiled on that day, week by week, and a bulletin based on the compilation is sent for publication to a large number of newspapers, and to sanitary and medical journals. A telegraphic abstract from the compilation is also sent weekly to a Michigan Press Association. A reprint of the bulletin is sent monthly to observers of diseases and to the sanitary journals and exchanges. The following is a copy of the bulletin for the week ending October 6, 1883, including a summary comparison for the month of September, 1883:

Health in Michigan.

Reports to the State Board of Health, Lansing, by observers in different parts of the State, show the principal diseases which caused most sickness in Michigan, during the week ending Oct. 6, 1883, as follows:

NUMBER OF OBSERVERS HEARD FROM, 49.	FOR PRECEDING WEEK.
DISEASES, ARRANGED IN ORDER OF GREATEST AREA OF PREVALENCE.	Per Cent of Observers who reported the disease present.
Intermittent fever.....	78
Neuralgia.....	67
Diarrhea.....	61
Rheumatism.....	59
Bronchitis.....	51
Remittent fever.....	49
Consumption, of lungs.....	45
Tonsillitis.....	41
Influenza.....	39
Inflammation of kidneys.....	22
Typho-malarial fever.....	20
Typhoid fever (enteric).....	20
Diphtheria.....	20
Dysentery.....	18
Scarlet fever.....	14
Cholera infantum.....	14
Erysipelas.....	14
Inflammation of bowels.....	12
Cholera morbus.....	12
Whooping-cough.....	12
Pneumonia.....	12
Measles.....	6
Puerperal fever.....	6
Inflammation of brain.....	4
Cerebro-spinal meningitis.....	4

For the week ending Oct. 6, 1883, the reports indicate that influenza, diphtheria, and intermittent fever increased, and that dysentery, typho-malarial fever, pneumonia, and cholera morbus decreased in area of prevalence.

At the State capitol, the prevailing winds during the week ending Oct. 6, were northwest, and compared with the preceding week, the temperature was lower, the absolute and the relative humidity less, and the night ozone more, and the day ozone the same.

Compared with the average for the month of September in the preceding six years, remittent fever, intermittent fever, and typho-malarial fever were considerably less prevalent, and consumption, whooping-cough, diphtheria, and cholera morbus less prevalent during September, 1883.

For the month of September, 1883, compared with the average of corresponding months for the five years 1879-83, the temperature was lower, the absolute and the relative humidity, and the night ozone, slightly less, and the day ozone considerably less.

Including reports by regular observers and others, diphtheria was reported present during the week ending Oct. 6, and since, at 26 places, viz: Calumet, Coldwater, Clarenc, Olam Lake, Detroit, Ensley, Grand Rapids, Ida, Jackson, Kalamazoo, Kendall, Lansing, Manistee, Manton, Monroe, Mt. Pleasant, Nashville, Newberry, Niles, Pontiac, Petersburg, Saginaw, Sault Ste. Marie, Somerset, Utica, Whitehall. Scarlet fever at twenty places: Bingham, Belvidere, Detroit, Dor, Edmore, Fentonville, Grand Rapids, Ithaca, Jackson, Lowell, Manistee, Manton, Monroe, Mendon, Nashville, Plerson, Saginaw, Somerset, Summit, Whitehall. Measles at four places: Charlevoix, Grand Rapids, Otsego, Union City.

HENRY B. BAKER, *Secretary.*

Lansing, Oct. 10, 1883.

NAMES AND ADDRESSES OF HEALTH OFFICERS OF TOWNSHIPS, CITIES, AND VILLAGES.

This office seeks to maintain constant communication with every local board of health, and that this may be done keeps a carefully corrected list of all health officers returned in accordance with requirements of the law. Most of the health officers are appointed soon after the spring elections.

In March, 1883, a circular (60) was sent to supervisors of townships, presidents, and clerks of villages, and mayors and clerks of cities, transmitting a blank form (E. or F.) for return of name and post-office address and certain other facts respecting persons appointed as health officers for the year 1883-4. The circular is as follows:

[60]

OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH, }
LANSING, MICH, April, 1883.

To the Supervisor, as President of the Township Board of Health:

DEAR SIR: Your attention is respectfully asked to the general law relative to Boards of Health in this State, as amended by Act 202, Laws of 1881, which amended section, 1693, being section 2 of chapter 46, Compiled Laws of 1871. The amendment is such that the section now applies to all boards of health, whereas before it only named township boards of health, though made to apply to cities and villages by section 1740 as amended in 1879. The section (1693) as amended in 1881 is as follows:

(1693.) Sec. 2. Every board of health shall appoint and constantly have a health officer, who shall be a well-educated physician and act as the sanitary adviser and an executive officer of the

board: *Provided*, that in townships where it is not practicable to secure the services of a well-educated and suitable physician, the board may appoint the supervisor or some other person as such health officer. The board of health shall establish his salary or other compensation, and shall regulate and audit all fees and charges of persons employed by them in the execution of the health laws and of their own regulations. Within thirty days after the annual township meeting in each year, the board of health shall meet for the transaction of business, and shall appoint or re-appoint a health officer, and shall immediately cause to be transmitted to the Secretary of the State Board of Health, at Lansing, the full name and postoffice address of such health officer, and a statement whether he is a physician, the supervisor, or some other person not a physician. A special meeting of the board may be called by the order of the president or of any two members of said board.

If for any reason a health officer is not appointed immediately, it will then be necessary to appoint one as soon as possible to fill the vacancy; as will also be necessary if the officer appointed does not qualify. Vacancies also occur whenever the incumbent of an office ceases to be an inhabitant of the township, city, or village for which he was elected or appointed an officer.—See section 617, Compiled Laws of Michigan, 1871. The law requires that every board of health shall constantly have a health officer, and provides for calling special meetings, so that there would seem to be no difficulty in complying with the requirement.

If any change of the health officer occurs, or if his postoffice address is changed it will facilitate our work if your board will cause a notice of such change to be sent to this office.

In addition to his services as sanitary adviser of your local board of health, it is desirable that your health officer correspond freely with this office concerning subjects connected with the public health in your locality. Any important sanitary experience of your board may, if thus reported, be made useful to other boards of health throughout the State. In order that your health officer may act promptly and decisively for the restriction of contagious diseases, it is best to authorize him to proceed immediately when a case of contagious disease within his jurisdiction comes to his knowledge, without the delay incident to calling the board of health together.

The Annual Reports of the State Board of Health have been sent, year by year, to the health officers whose names and addresses have been returned to this office; but when no return of the name and address of the health officer is received no Report is sent, because it is not known to whom to send the Report.

Herewith please find a blank form and printed envelope for the use of your board in sending to this office the statement of NAME and POSTOFFICE ADDRESS of your HEALTH OFFICER, and whether or not he is a physician, as required by this law.

Very respectfully,

HENRY B. BAKER, *Secretary*.

Form E is as follows; form F is similar to E, but adapted for cities and villages; it is printed on page xi. of the report for 1882.

[Please fill every blank, by words or figures, or as directed in the foot-notes. Do not mark out any printed words.]

[E.]

To the Secretary of the State Board of Health, Lansing, Michigan.:

SIR.—On the day of 188..., the Township Board, being the Board of Health of the Township of County of State of Michigan, met for the transaction of business, and appointed a Health Officer.

The name of the Health Officer of this township is ; his post office address is County of Michigan.

He a physician.

He the Supervisor of this township.

..... Supervisor,
..... of the township of

Postoffice address
..... Township Clerk,
and Clerk of the Board of Health.

Postoffice address
This return is made out by \$
Dated at this day of 188...

* If re-appointed, write "re-;" if not, draw a line.

† Insert the word "is," or "is not," as the case may be.

‡ It is not essential that more than one of the officers sign this return but it is desirable to have the name and postoffice address of each given. If either officer writes in the name of the other, this fact should appear on this return, so that the officer making the return may be known.

§ Insert the words "the Clerk," "the Supervisor," "the Clerk and Supervisor," or otherwise state the facts.

[~~Postage~~ Postage must be prepaid on this return, at letter rate, three cents for each half-ounce or fraction thereof.]

A return of a health officer is sometimes received on this blank not fully or properly filled out. In such a case the blank is marked at the points on which further information is desired and again sent to the person who filled it out, for a more complete statement.

In May the circular and blank form were sent again to localities from which no return of a health officer had been received. The whole number of health officers returned for 1883 was, in townships, 926; in villages, 146; in cities, 41; total, 1,113.

METEOROLOGICAL REPORTS.

A list of meteorological observers for the calendar year 1883, with a statement of what registers were received from each, is printed on page 122. The reports are summarized in an article on The Principal Meteorological Conditions in Michigan in the year 1882, on pages 121-196.

The observations made at the office of the Board, at Lansing, have been summarized weekly, and a copy of the summary has been furnished for publication to the *Lansing Republican*. Reprints from this have been distributed weekly to the meteorological observers, and monthly to observers of diseases and to the sanitary journals and other exchanges of the office of the Board. The report for the week ending Saturday, October 6, 1883, containing a summary for September, is as follows:

Meteorological Report.

From observations at 7 A. M., 2 P. M., and 9 P. M. daily, at the office of the State Board of Health, State capitol, Lansing, Mich., week ending Saturday, October 6, 1883.
Lat., 42° 43' 53.11"; long., 84° 33' 19.68."

Day of Week.	Day of Month.	Temperature.— Degrees F.			Barometer, Average Height. (Corr'd for Temp.)	Inches of Rain.	Grains of Vapor in a cubic foot of air.	Relative Humidity.	Ozone. Maximum =10.	
		High- est.*	Low- est.*	Average.					Day.	Night
Sunday.....	30	61	37	49	29.022	0	3.06	69	2	3
Monday.....	1	61	37	48	28.902	.48	3.06	71	2	4
Tuesday.....	2	60	38	50	28.810	0	3.07	66	4	3
Wednesday.....	3	56	31	45	29.241	0	2.29	55	3	1
Thursday.....	4	53	33	43½	29.386	0	2.39	63	0	1
Friday.....	5	57	39	49	29.244	.15	3.01	66	1	4
Saturday.....	6	50	41	48	29.210	0	3.73	93	3	4
Week a.....		61	31	47.48	29.115	.63	2.95	69	2.14	2.86
Preceding week b.....		72	37	53.71	28.983	.80	3.77	72	2.14	2.43
September.....		89	32	59.42	29.117	3.37	4.24	68	1.60	2.03
Norm. c.....		90	36	62.84	29.082	3.20	4.76	69	2.98	2.95

* By registering thermometers read at 7 A. M. for the preceding calendar day.

a Week ending Oct. 6.

b Preceding week, ending Sept. 29.

c Average for corresponding month in the 5 years, 1879-1883.

For WEEK ending October 6, range of temperature 30°, of barometer .711 in., of ozone 4°; prevailing winds, N. W.; average velocity of wind, 7.4 miles per hour; greatest velocity (5th), 24 miles per hour; frost, 1, 3, 4, 5.

For MONTH of September, highest barometer (9th), 29.502 in.; lowest (24th), 28.589 in.; average velocity of wind, 8.1 miles per hour; greatest velocity (4th), 35 miles per hour; prevailing winds north and southwest.

EXAMINATION OF PLANS FOR PUBLIC BUILDINGS.

Act 206 of 1881 requires plans for certain State buildings to be submitted to the State Board of Health, and the State Board of Corrections and Charities for examination. A report of examinations in 1883 is printed on pages 117, 120, and 29.

BOOKS AND PERIODICALS.

A list of the books and periodicals received by the library of the Board by purchase, exchange, and gift is given in the annual report of property, on the following pages, together with the names and addresses of the donors.

OTHER DISSEMINATION OF INFORMATION.

On receipt of names and addresses of health officers there are sent to each copies of the documents on restriction and prevention of diphtheria, scarlet

fever, and small-pox, and the general document on restriction and prevention of contagious diseases; also the circular 55 or 64 (pages 67-78) on work of health officers and local boards of health.

On the first publication of these documents enough copies have been sent to supply each member of the local board of health. Where no health officer has been returned, documents have been sent to the president of the board of health for the health officer.

Copies of the appropriate document on restriction and prevention of a disease in sufficient number to permit a distribution to families in the immediate vicinity of a case of diphtheria, scarlet fever, or small-pox, are sent immediately on receipt of information of the occurrence of one of these diseases in any part of the State, with a request to the health officer or other local officer addressed to put them where they will do the most good. Copies of these documents in German or in Dutch are also sent when it is thought they can be used to advantage.

There has also been a considerable distribution of these documents to other local officers, to school teachers, and to newspapers in the State.

The annual Report of the Board for 1882 has been distributed to all health officers whose names have been reported to this office, to presidents and clerks of city and village boards of health, and to many other officers and citizens.

The correspondence of the office with local health authorities and with others on sanitary subjects has been large, those communications copied covering 1,895 letter book pages, and not including all postals, of which a large number have been sent out.

Three sanitary conventions were held during the year: at Pontiac, Reed City, and Muskegon.

REPORT OF THE SECRETARY RELATIVE TO PROPERTY, ETC., FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1883.

To the President and Members of the Michigan State Board of Health:

GENTLEMEN:—In compliance with section 5 of Article II. of the by-laws of this Board, the following report of the "nature and amount of property belonging to the Board, which has been received, issued, expended, and destroyed since the last report, and of the property remaining on hand, and also in whose care each item of property is intrusted," is respectfully submitted.

For an account of the instruments and articles of a similar nature, which were on hand at the time of making the last reports, you are respectfully referred to pages xii.-xv. of the Report for 1875, xxvii.-xxxi. for 1876, xl.-liv. for 1877, xxxv.-xlvi. for 1878, xix.-xliii. for 1879, xxi.-xxxvi. for 1880, xviii.-xxii. for 1881, and xv.-xxvi. for 1882. Since that time articles of this class have been purchased as follows:

Two rain gauges.
Seven over-flow tubes for rain-gauges.
Two psychrometers.
Three psychrometer cups.
Two minimum and three maximum registering thermometers.
Three letter copying books.
One water bowl and brush (for press copying).
Two dozen Van Horn clips.
Three ivory folders.
One rubber dating stamp.
One hatchet.

Three electrotype plates, diphtheria at the asylum at Kalamazoo.
One zinc plate, house drainage.
Two zinc plates, diphtheria at Grand Rapids.
One electrotype plate, ventilation of soil pipe.
Twenty-one electrotype plates, meteorological conditions in Michigan, in 1881.
Two electrotype plates, "cone of pollution" and "cone of infiltration."
Sixteen electrotype plates, small-pox prevention document, in Dutch.
Five zinc plates, "Diseases in Michigan in 1882."

Meteorological instruments have been entrusted to observers as follows:

BAROMETER, psychrometer, and rain-gauge transferred from D. R. Waters to Rev. J. Pierson, Ionia. Barometer, psychrometer, set of registering thermometers, and rain-gauge transferred from Dr. Edwin Stewart to Dr. C. W. Shepard, Mendon. Barometer (returned by Lewis Marvill) to Dr. J. S. Caulkins, Thornville.

REGISTERING THERMOMETERS (one set each) to Frank H. Coe, Phoenix; C. E. Swift, Lexington; Rev. J. Pierson, Ionia. One maximum registering thermometer (to replace one broken) to Dr. E. S. Richardson, Reed City.

PSYCHROMETERS, one (returned by Lewis Marvill) to Frank H. Coe, Phoenix; one (returned by Orrin Dean, Jr.,) with new cup, to C. E. Swift, Lexington.

Overflow tubes for rain-gauge, one each to Dr. L. G. North, Tecumseh; Dr. C. W. Shepard, Mendon; W. T. Drake, Marshall; Dr. J. S. Caulkins, Thornville; Lee S. Cobb, Winfield; Dr. E. S. Richardson, Reed City; S. E. Walt, Traverse City.

Books and other publications have been received and placed in the library of the Board (during the year ending Sept. 30, 1883) as follows:

BY PURCHASE:

- | | |
|--|---|
| <p>Am. Jour. Med. Sciences, Phila.
British Med. Journal, London.
Comptes Rendus, Paris.
Detroit Lancet, Detroit.
Index Medicus, New York.
London Lancet, London.
Medical Record, New York.
Nature, London.
Philadelphia Med. Times, Phila.
Popular Science Monthly, New York.
Pop. Science News, and Boston Jour. of Chem.
U. S. Postal Guide, Boston.
Practitioner, London.
Sanitary Engineer, New York.
Sanitary Record, London.
Scientific American and Sup., New York.
Reports of Am. Pub. Health Ass'n, 1878, '79, '80.
Boston Medical and Surg. Jour., May 15, 1879.
Trans. of the Mass. Medico-Legal Soc., Vol. I, Nos. I, II, III.
What to do in Cases of Poisoning.—Murrell.
Encyclopedia Britannica, Vols. XIII-XV. INF. to MEM.
Michigan Almanac for 1883.
Gallord's Med. Journal, May, 1882.
Rand, McNally & Co.'s Indexed Atlas of World.
How to be Weather-wise.—Noyes.
Etiology, Pathology, and Treatment of Baldness and Grayness.—Robinson.
Report (and Index) from select committee, on Habitual Drunkards.
Second Report of Inspector of Retreats, under Habitual Drunkards' Act, for 1881.
Report of Commissioners on Small-pox and Fever Hospitals.
11th Annual Report of Local Gov't Board (Eng.), 1881-82.
20th Report of Inspector of Reformatory and Industrial Schools of Ireland.
Water-Analysis; a handbook for water drinkers.
Supplement to 10th annual report of Local Gov't Board; papers on use and influence of Hospitals for Infectious Diseases.
Supplement to 11th Annual Report of Local Gov't Board; Report of Medical Officer for 1881.
International Scientists' Directory in America, Europe, Asia, Africa, and Oceania.
39th, 42d, 43d, and 44th Ann. Reports of Registrar Gen., of Births, Deaths, and Marriages in Eng. (Abstracts of 1876, 1879, 1880, and 1881.)
Proceedings of Conference of Charities, at Meetings of Am. Social Science Ass'n, 1875, 1877-80.
Handbook of Vaccination.—Seaton.</p> | <p>Varicella; 21 heliotype plates illustrating stages of eruption.
System of physical education, theoretical and practical.—Maclaren.
British Medical Journal, Nov. 26, 1881.
Journal of Scottish Meteorological Society with tables, Jan.-June, 1877. Nos. LV-LVI.
Elementary Meteorology.—Scott.
Dictionary of medicine.—Quain.
Hygiene and Treatment of Catarrh.—Rumbold.
Disinfectants and how to use them.—Wilson.
Table showing number of marriages, births, and deaths in Eng. in 1881.
Cattle disease (U. S. of America).
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 Annali di Statistica Serie 3^a, Vol. 4^o, Saggia di Bibliografia Statistica Italiana.
Morley, Col. F., Detroit, Mich.:—
 Report of Commissioner of Immigration, Mich., 1881, 1882.
Nagle, M. D., J. T., New York, N. Y.:—
 New York City Record, Report Board of Health 4th quarter, 1882.
 Suicides in N. Y. City, 11 years ending 1880.
Neal, M. D., Thos. L., Dayton, O.:—
 Report of Dayton Board of Health, 1882.
Neal, M. D., W. A., Elkhart, Ind.:—
 Sanitary Condition of Elkhart.

- Nelson, M. D., A. W., New London, Conn.:*—
Veratrum Viride in Typhoid Fever.
- Newell, M. D., T., Providence, R. I.:*—
Paper before Providence Franklin Society, 1883.
Newell.
- Newton, W. K., Paterson, N. J.:*—
Supplement to Act relating to Local Boards of Health, 1881.
- Act prohibiting sale of cigarettes or tobacco to minors.
- Supplement to Act to regulate sale of Petroleum and its products, 1881.
- Supplement to Act to regulate the Practice of Medicine and Surgery, 1881.
- Rules for Care of Infants.
- New Jersey Board of Health Circular as to Petroleum, Kerosene, etc.
- City Ordinance respecting Contagious Diseases.
- Ordinance concerning the Food Supply.
- Ordinance concerning Tenement and other houses, and Factories.
- Ordinance concerning Nuisances.
- N. Y. Academy of Sciences, New York, N. Y.:*
Relation of Science to Modern Life.—Potter.
- Nichols, Wm. Ripley, Boston, Mass.:*
Water-supply, from a Chemical and Sanitary Standpoint.—Nichols.
- Nipher, F. E., St. Louis, Mo.:*
Notes on American Earthquakes. No. 12.
- Oldright, M. D., Wm., Toronto, Ont.:*
Extracts from Report of Committee of Ont. Med. Ass'n on Public Health, Vital Statistics, and Climatology.
- On the Disposal of Sewage.
- Classified Catalogue of Museum of Toronto School of Medicine.
- Orton, L. L., D., Edward, Columbus, Ohio:*
Relation of the State to Health of the People.—Orton.
- Palmer, M. D., Geo. C., Kalamazoo, Mich.:*
Report of Trustees of Mich. Asylum for Insane, 1881-82.
- Penrod, H. J., New York, N. Y.:*
Penrod's Universal Code of Weather Signals.
- Playter, M. D., Edward, Toronto, Ont.:*
Causes of Consumption, 1882.
- Pratt, M. D., Foster, Kalamazoo, Mich.:*
Report of Kalamazoo, 1881. History of the Fire and Water Department, 1843 to 1881.
- Pringle, Hon. Eugene, Lansing, Mich.:*
Report of Commissioner of Insurance of Mich. 1882. Part III, Life.
- Report of Commissioner of Insurance, Mich., 1882.
- Pritchard, B. D., Lansing, Mich.:*
Report of the State Treasurer of Michigan, 1882.
- Provincial Board of Health, Toronto, Ont.:*
Report of Provincial Board of Health, Ont., 1882.
- Ranney, M. D., Geo. E., Lansing, Mich.:*
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- Rauch, M. D., John, Springfield, Ill.:*
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- Report of Ill. Board of Health, 1881.
- "Pass Him Around." A live barber assumes a dead doctor's name, and obtains a State Board of Health certificate on forged letters and a stolen diploma.
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- Bellevue Medical College, of Massachusetts.
- Proceedings of Ill. Board of Health, Jan., April, June, 1883.
- Circulars of Ill. Board of Health, Small-pox, Diphtheria, Scarlet Fever, Typhoid Fever.
- Reeve, M. D., J. T., Appleton, Wis.:*
Reports of Wis. Board of Health, 1881, 1882.
- Leprosy in Wisconsin.
- Powers and Duties of Local Boards of Health.
- Reeves, M. D., J. E., Wheeling, W. Va.:*
Message of Gov. J. B. Jackson to W. Va. Legislature, 1883.
- Robbins, D. C., New York, N. Y.:*
Review of Drug Trade of N. Y., 1882.
- Rose, M. D., D. D., Urbana, Illinois:*
Treatment of Extrophy of the Bladder. Prince.
- Malaria and Struma: Their Relation to Etiology of Skin Diseases.—Yandell.
- Bathing, Cupping, Electricity, Massage.—Prince.
- The Bacteria.—Burrill.
- Rupell, Dr. J. A., Edinburgh, Scotland:*
Proceedings of Royal Society of Edinburgh, 1882-1883.
- Russell, M. D., James B., Glasgow, Scotland:*
Memorandum on Hospital Accommodation for Infectious Diseases in Glasgow.
- Ruttan Manufacturing Co.:*
Warming and Ventilating by Ruttan Manf. Co.
- Ryan, M. D., H., Caldwell, Texas:*
Treatise on Eclectic Southern Practice of Medicine.
- Schadberg, M. D., H. H., Kalamazoo, Mich.:*
Regulations adopted by President and Trustees of Village of Kalamazoo, acting as Board of Health.
- Schreiber, M. D., Paul, Chemnitz, Saxony.:*
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- Secretary of State, Washington, D. C.:*
Reports from U. S. Consuls. No. 22, Aug., 1882.
- Secretary of the Treasury, Washington, D. C.:*
Quarterly Report of Bureau of Statistics, Treasury Dep't; Imports, Exports, Immigration, and Navigation of U. S., Dec., 1882, March, 1883.
- Sekell, C. E., A. C., Grand Rapids, Mich.:*—
Plans of proposed sewerage, of Mt. Pleasant, Mich.
- Sheehan, M. D., W. F., Rochester, N. Y.:*—
Report of Health Officer, Rochester, 1882-3.
- Sheldon, M. D., F. C., Pasadena, Cal.:*—
Report Cal. Board of Health, July, 1880, to December, 1881.
- Shields, Dr. A. M., Rochester, Ind.:*—
Regulations and Nosological table by Ind. Board of Health.
- Smart, M. D., C., Washington, D. C.:*—
Review of operations of Nat. Board of Health, 1882.
- Report of the Nat. Board of Health, 1882.

- Smith, C. D., Portland, Me.:*—
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- Smith, Wm. M., Syracuse, N. Y.:*—
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- Smith, M. D., Wm. M., New York, N. Y.:*—
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- Snow, M. D., E. M., Providence, R. I.:*—
Communication relative to Prevalence of Typhoid Fever. Snow.
- Report of Deaths during Nov., 1882.
- Report of Births, Marriages, and Deaths, Providence, 1882.
- Census of City of Providence, Jan. 1, 1883.
- Surgeon General, U. S. Army, Washington, D. C.:*—
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- State Boards of Health, Little Rock, Ark.:*—
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- Stearns, M. D., H. P., Hartford, Conn.:*—
Report of Hartford Retreat for Insane, 1883.
- Stevens, M. D., T. M., Indianapolis, Ind.:*—
State Boards of Health: Their Object, Use, etc. Report of Ind. Board of Health, 1882.
- History of Health Work in Indiana.
- Answer of Thad. M. Stevens, M. D., to charges of Ind. State Board of Health, 1883.
- Stone, Rev. E. M., Providence, R. I.:*—
Report of School Committee of Providence, 1882.
- Stroud, M. D., E. L., Fort Worth, Tex.:*—
Texas Courier Record of Medicine, Sept., 1883.
- Tatham, M. D., J., Salford, Eng.:*—
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- Report on the Health of Salford, 1881.
- Taylor, M. D., J. S., Liverpool, Eng.:*—
Health of Liverpool, 1882, with fever map.
- Tenney, Mrs. Harriet A., Lansing, Mich.:*—
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- Thomas, J. G., Savannah, Ga.:*—
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- Thornton, M. D., G. B., Memphis, Tenn.:*—
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- Tommasi-Crudeli, M. D., Prof. Conrad, Rome, Italy:*—
La Malaria des Trois Fontaines en 1882.
- Études sur l'assainissement de la campagne romaine. La préservation de l'homme dans les pays a malaria.
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Reports New York City Board of Health, 1874, '75, '76, '77.
- Townshend, M. D., Smith, Washington, D. C.:*—
Report Health Officer of Dist. of Col. for 1881-82.
- Vandervoort, M. D., John L., New York, N. Y.:*—
Report of N. Y. Hospital and Bloomingdale Asylum, 1882.
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- Les systèmes d'évacuation des eaux et immondices d'une ville. Refutation des observations et des documents produit par M. A. Durand-Claye. Paris, 1880.
- VanPelt, M. D., C. L., Toledo, Ohio:*—
Report of Toledo Board of Health, 1882.
- VanRiper, J. J., Lansing, Mich.:*—
Report of the Attorney General of Mich., 1882.
- Varrentrapp, Dr. G., Frankfurt, Germany:*—
Offenen Brief an Herrn Dr. Erhardt.
- De l'imprisonnement individuel sous le rapport sanitaire et des attaques dirigées contre lui.
- Ausschlussbericht an die gesetzgebende Versammlung, Gefängnisneubau betreffend.
- Ueber die bisherigen Ergebnisse der Ferienkolonien.
- Gutachten des ärztlichen Vereines da hier über die Zutraglichkeit Gebirgsquellen aus dem Vogelsberge als Genussmittel für die Bevölkerung.
- Ausschlussbericht an die Gesetzgebende Versammlung in Betreff der Wasserleitung, speciell Anlage eines artesischen Brunnens durch die Herren kind.
- Statistische Mittheilungen über den Civilstand der Stadt Frankfurt am Main in 1880, auch 1881.
- Separat-Abdruck aus der Deutschen Vierteljahrsschrift für öffentliche Gesundheitspflege.
- Canalisation von Frankfurt am Main.
- Die Riesfelder—Anlagen in Danzig, Berlin, und Paris.
- Voigt, Dr. Leonhard, Hamburg, Germany:*—
Vaccine and Variola.
- Youle, C. H., Troy, O.:*—
Report of Sidney Board of Health, 1882.
- Walcott, H. P., Boston, Mass.:*—
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- Wales, M. D., Philip S., Washington, D. C.:*—
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- Wardner, M. D., H., Anna, Ill.:*—
Report of Ill. Southern Hospital for Insane, Oct., 1882.
- Waring, Jr., Col. Geo. E., Newport, R. I.:*—
Of Herring's Project for Sewerage of Binghampton, N. Y.
- Watson, M. D., I. A., Concord, N. H.:*—
Reports of N. H. Board of Health, 1882, 1883, with Registration Reports, 1881, 1882.
- Prevention and Restriction of Small-pox, by N. H. Board of Health.
- Regulations of the Board of Health of Franklin, N. H.; Suggestions for the Prevention and Restriction of Small-pox.
- Order to Local Health Boards from N. H. B'd of Health.
- Common Law Citations relating to Nuisances.
- Wells, C. M., Traverse City, Mich.:*—
Specifications, Instructions, and Conditions of Contract for Erection of Northern Mich. Asylum for the Insane.

Report of Commissioners on location and site for Additional Asylum for the Insane, Mich., 1882.
Report of Commissioners of Northern Asylum for Insane for 1882.

Wenzel, M. D., Henry P., Milwaukee, Wis.:
Diseased Meat and its Relations to Health.

Whelan, M. D., Bion, Hillsdale, Mich.:

Health and Sanitary Condition of Hillsdale, 1882.

Whipple, G. M., Richmond, Eng.:

Barometric Gradients in connection with Wind Velocity and Direction, at Kew Observatory.

Report of Kew Committee for 1882, with results of Magnetical and Meteorological Observations.

Wight, M. D., O. W., Detroit, Mich.:

Laws requiring Medical Men to Report Deaths and Infectious Disease to Public Authorities.

Notification of Contagious Dis. in Detroit, 1882.

Report of Detroit Board of Health, 1883.

Wolf, Dr. T. R., Newark, Del.:

Report of State Chemist. Analyses of Fertilizers.—Wolf.

Wood, M. D., R. W., Jamaica Plain, Mass.:

Financial Connection of Use of Spirits and Wine with the People of Concord, Mass.—Jarvis.

Excepting certain publications drawn out by members of the Board and others, the foregoing, together with those accounted for at date of last annual report as in the library or drawn out, are in the library and in good condition. Those drawn out and not yet returned are as follows:—

BY HOMER O. HITCHCOCK, M. D.

Memoirs on Diphtheria, Library No. 716.

Prevention of Cholera Infantum and Kindred Disorders, No. 1528.

BY HON. LE ROY PARKER.

Sanitary Chart on Management of Infants, No. 2515.

BY REV. D. C. JACOKES, D. D.

Report Mass. Board of Education on Proposed Survey of the Commonwealth, No. 869.

Memorandum of Am. Pub. Health Ass'n, on Legislation Affecting Public Health. No. 1750 (1255.)

13th Annual Report of Health Dept. Cincinnati, O., 1879, No. 2009.

Sanitary Engineer for Feb. 15, 1881.

Circular of Inquiry by Wis. Board of Health, to School Teachers.

BY HENRY F. LYSTER, M. D.

Separate System of Drainage, No. 326.

Public Health, June 9, 1876.

Uppingham By-Laws and Regulations on House Drainage, No. 968.

Plumber and Sanitary Engineer, Oct., Nov., Dec., 1878.

Statement of Objects of Sanitary Protection Association, Edinburgh.

Statement of Objects of Sanitary Protection Association, Newport, R. I., No. 1359.

Mass. Board of Health Circulars on Drainage, and on House Drainage, Nos. 1367, 1599.

Twelve Photographs, Illustrative of Influence of Climate on Phthisis and Rheumatism, No. 1595.

Playter's Elementary Anatomy, Physiology, and Hygiene, No. 1762.

Sanitary Record, June 15, 1882.

BY JOHN H. KELLOGG, M. D.

Life History of Contagium, First and Third Contributions, Nos. 915, 2883.

Am. Med. Bi-Weekly, Aug. 16, 1879.

Am. Journal of Med. Sciences, Vol. 78, July-Oct., 1879, No. 3109.

Am. Med. Bi-Weekly, Jan.-June, 1878, No. 1548.

Sanitary Record, July 15 and Aug. 15, 1879.

Sanitary Record, Vol. VI., Jan.-June, 1877, No. 1559.

London Lancet, Jan., 1881.

London Lancet, July-Dec., 1881, No. 3160.

Louisville Med. News, Nov. 12, 1881, and April 8, 1882.

Canada Lancet, Feb., 1882.

Medical News, Feb. 18, 1882.

Proceedings Conn. Med. Society, 1879, No. 1627.

N. Y. Med. Record, Aug. 13, 1881, Feb. 11, Feb. 25, and March 11, 1882.

N. Y. Med. Record, Vol. 19, Jan.-June, 1881, No. 3103.

Wood, M. D., Thomas F., Wilmington, N. C.:

Conjoint Session of N. C. Board of Health and Medical Society, 1882.

Right Relation of General Public to State Preventive Medicine.

Young, William, Westminster, London, Eng.:

Momentous Education Question, etc., also On the Periodicity of Small-pox, with Remarks on Vaccination.

Pasteur and Jenner; an Example and a Warning. National Anti-Compulsory Vaccination Reporter, Vol. VII., No. 8.

Pasteur's Inoculations, and Tyndall's Forecast of Future Prophylactic Medicine.

A few words on Vaccination.—Taylor.

Trans. of Vaccination Inquiry, Part I.

Momentous Education Question for the Parents and Others.

From—

Manufacturer's Circular, N. Y. State Oil Tester, Oct. 2.

Report of the Local Government Board, 1880-81;

Supplement containing papers on Use and Influence of Hospitals for Infectious Diseases.

xxvi STATE BOARD OF HEALTH,—REPORT OF SECRETARY, 1883.

Am. Journal of Med. Sciences, Jan., 1882.
 Md. Med. Journal, Vol. 8, May, 1881, to April, 1882, No. 3082.
 Chicago Med. Journal and Examiner, vols. 40, 42, Nos. 3069, 3091.
 Cincinnati Lancet and Clinic, Vols. 3, 5, and 6, Nos. 3074, 3076, 3077.
 Cincinnati Lancet and Clinic, January 28, 1882.

BY HENRY B. BAKER, M. D.

Journal of Hygiene, Sept. 1, 1881, and July 9-16, 1882.
 Trans. Med. Chir. Soc. London. Vol. 33. No. 2642.
 Parasites and Messmates. No. 710.
 Sanitary Engineer, N. Y., June 7, 1883.
 N. Y. Med. Abstract, April, 1883.

BY JOHN AVERY, M. D.

Trans. Mich. Med. Society, 1874. No. 73.

BY BELA COGSHALL, M. D.

Scientific American, July 5, 1879.

BY C. C. YEMANS, M. D.

Report on Plans for Securing Records of Deaths. Harris. No. 1703.
 State Boards of Health, etc. Stevens. No. 3395.
 Fallacies of Statistics. Rumsay. 678.
 Death Rate of Each Sex in Michigan. Baker. No. 538.

BY HON. W. W. ROOT, M. D.

Mayor's Address, Aurora, Ill., 1879. No. 1414.
 Sanitary Work in Lansing, Mich. 2031.

WEEKLY OR MONTHLY MORTALITY STATEMENTS.

These have been received during the past year from health officers, registrars, officers of boards of health, or of cities in the United States or foreign countries, as follows:—

Abbott, M. D., S. W., Health Officer, Department of Health, State House, Boston, Mass.
 Ashmun, M. D., G. C., Health Officer, Cleveland, Ohio.
 Atwater, M. D., H. H., Health Officer, Burlington, Vt.
 Baldwin, M. D., A. S., Chair. Com. on Vital Statistics, Board of Health, Jacksonville, Fla.
 Boyd, Geo., Registrar Vital Statistics, Paterson, N. J.
 Boyd, M. D., S. B., Secretary Board of Health, Knoxville, Tenn.
 Bradway, M. D., J. R., Health Officer, Oakland, Cal.
 Bramble, M. D., L. E., Health Officer, Cincinnati, Ohio.
 Brewer, M. D., Charles, Vineland, N. J.
 Briggs, M. D., Albert H., Health Physician, Buffalo, N. Y.
 Buckley, M. D., Charles, Health Officer, Rochester, N. Y.
 Buck, M. D., Health Officer and City Physician, Oakland, Cal.
 Buduin, Dr. L. Scheltema, Secretaris, Amsterdam, Holland.
 Bureau D'Hygiene, Havre, France.
 Cabell, M. D., J. G., Prest. Board of Health, Richmond, Va.
 Carter, A. Robert, Sec. City Board of Health, Baltimore, Md.
 Canniff, Dr., Medical Health Officer, Toronto, Ont.
 Cargill, H. N., Clerk of Board of Health, Grand Rapids, Mich.
 Chamberlain, Dr. C. W., Sec. State Board of Health, Hartford, Conn.
 Cheatham, M. D., Richard, Health Officer, Nashville, Tenn.
 Cocchi, A. Il Direttore, Dell' Ufficio di Statistica e Stata Della citer di Roma, Rome, Italy.
 Conn, M. D., Granville P. Health Officer, Concord, N. H.
 Day, M. D., Walter De F., Sanitary Supt. and Registrar, N. Y. City.
 Det. Kgl. Sundheds Collegium, Copenhagen, Denmark.
 Edwards, M. D., Tom O., Health Officer, Wheeling, W. Va.
 Fairchild, M. D., M. B. Physician to Board of Health, Syracuse, N. Y.
 Foster, M. D., Eugene, Prest. Board of Health, Augusta, Ga.
 Fournier, M. D., E. H., Registrar, Mobile, Ala.
 Fraser, M. D., E. B., Registrar, Wilmington, Del.
 Furnis, M. D., John P., Registrar, Selma, Ala.
 Galt, M. D., James D., Health Officer, Norfolk, Va.
 Gleason, M. D., M. K., Registrar Vital Statistics, and De Wolf, M. D., O. C., Health Officer, and
 McVicker, Brock L., Sec. City Board of Health, Chicago, Ill.
 Goldsmith, M., D. W. T., Pres't Board of Health, Atlanta, Ga.
 Gordon, M. D., E. W., Pres't Board of Health, Petersburg, Va.
 Grimsshaw, M. D., Thomas W., Registrar-General, Dublin, Ireland.
 Hargis, M. D., E. B. S., Health Officer, Pensacola, Fla.
 Health Officer, Lowell, Mass.

MORTALITY STATISTICS OF CITIES,—OFFICERS SENDING THEM. xxvii

Hatch, M. D., F. W., Sec. State Board of Health, Sacramento, Cal.
Horbbeck, M. D., H. B., City Registrar, Charleston, S. C.
Hoyt, Henry F., Health Officer, St. Paul, Minn.
Hudson, M. D., H. S., Registrar Vital Statistics, Selma, Ala.
Hunter, W. H., City Sexton, Lansing, Mich.
Hunt, M. D., James G., Health Officer, Utica, N. Y.
Iddings, M. D., A. H., Health Officer, Dayton, O.
Jones, M. D., J. S., Pres't, and Herrick, M. D., S. S., Sec. State Board of Health, New Orleans, La.
Knight, M. D., A. W., Health Officer, Jacksonville, Fla.
La Rocque, M. D., A. B., Medical Health Officer, Montreal, P. Q.
Lindsley, M. D., C. A., Health Officer, New Haven, Conn.
Lindley, M. D., Walter, Health Officer Los Angeles, Cal.
Love, Geo. A., Clerk Board of Health, Grand Rapids, Mich.
Luedeking, Dr. Robert, Sec. Board of Health, St. Louis, Mo.
Martin, M. D., R., Commissioner of Health, Milwaukee, Wis.
Matlocks, M. D., Brewer, Pres't Board of Health, St. Paul, Minn.
McLeod, A. M., M. D., D. K., Surgeon Major, Health Officer, Calcutta, East India.
Means, M. D., T. A., Health Officer and Registrar, Montgomery, Ala.
Meares, M. D., J. L., Health Officer, San Francisco, Cal.
Mitchell, M. D., Chas., Acting Health Officer and Registrar, Nashville, Tenn.
Nagle, M. D., John T., Deputy Registrar of Records, N. Y. City.
Neal, M. D., Thos. L., Health Officer, Dayton, Ohio.
Nash, Dr. Herbert M., Pres't Board of Health, Norfolk, Va.
Park, M. D., J. P., Knoxville, Tenn.
Phelps, M. D., W. C., Health Officer, Buffalo, N. Y.
Riggs, Dr. B. H., Registrar, Selma, Ala.
Rowland, C. W., Health Officer, Cincinnati, Ohio.
Salisbury, M. D., A. H., Health Officer, Minneapolis, Minn.
Sheehan, M. D., Wm. F., Health Officer, Rochester, N. Y.
Selfridge, Gen. James L., Health Officer, Philadelphia, Pa.
Stearns, M. D., I. H., Health Officer, Milwaukee, Wis.
Statistisches Amt der Stadt Berlin, Berlin, Germany.
Snow, M. D., Edwin M., Supt. of Health, Providence, R. I.
Tatham, M. D., John, Medical Officer of Health, Salford, Eng.
Thornton, M. D., G. B., Pres't, and Purnell, M. D., J. H., Sec. of Board of Health, Memphis, Tenn.
Townshend, M. D., Smith, Health Officer and Registrar, Washington, D. C.
Trembley, M. D., J. B., Oakland, Cal.
Van Deman, M. D., J. H., Registrar Vital Statistics, Chattanooga, Tenn.
Van Pelt, M. D., Chas., Health Officer, Toledo, Ohio.
Wheaton, M. D., C. A. Health Officer, St. Paul, Minn.
Walcott, M. D., H. P., Health Officer, Boston, Mass.
Wellings, M. D., J. H., Health Officer, Lansing, Mich.
Wight, M. D., O. W., Health Officer, Detroit, Mich.
Wyckoff, M. D., R. M., Registrar of Records, Brooklyn, N. Y.

The following table shows the amount and kind of hard paper there was on hand at the time of making the last report, the amount purchased during the year, the amount used, and the amount now on hand:—

KIND OF PAPER.	On Hand at Last Report.		Purchased Since Last Report.		Used During the Year.		On Hand Now.	
	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.
Medium.....		122				92		30
Folio-post.....	14	401	20		22	351	12	50
Demy.....		261	1			341		400
Crown.....		552	5		5	72	1	
Cover paper.....	2	61			1	141		400
Manilla wrapping-paper..	1	216	5		3	96	3	120
Blotting-paper.....		54		120		49		125

The hard paper has been used in making blank books for use in the office, circulars, announcements and programs for sanitary conventions, printed letters, writing paper, etc. The cover paper has been used for covers to reprints and record-books for weekly reports of diseases, and wrappers for packages of ozone test-paper.

At the time of making the last report there were about 3,119 sheets of letter, half-letter, and note, 1 ream and 228 sheets of foolscap and legal cap paper on hand. Since that time 8,480 sheets of letter, half-letter and note paper have been made from folio-post paper. There are now on hand about 3,250 sheets of letter, and half-letter, 278 sheets of foolscap and legal cap. There have been issued to members of the board 950 sheets of letter, half-letter, and note paper. This shows about 7,399 sheets of letter, half-letter, and note paper, and 430 sheets of foolscap and legal cap to have been used in this office.

There were about 71,429 envelopes on hand when the last report was made; 57,000 have been purchased since, making a total of 128,429. There are about 94,356 on hand now, and 1,744 have been issued to members of the board, showing about 33,329 to have been used in conducting the business of the office.

There was on hand at the time of making the last report, \$345.68 in postage stamps, postal cards and postal money. Vouchers for postage and box rent have been allowed during the year to the amount of \$652.16. There is now on hand in postage stamps, unused postal cards, and postal money \$71.46. This shows that during the year the cost of postage and box rent has been \$926.38. Some of the principal items of postage have been as follows:

General distribution of the Report of the Board for 1881.....	\$72.40
General distribution of the Report of the Board for 1882.....	116.81
General distributions of documents and circulars, issued in numbers.....	106.70
Sending weekly meteorological, and monthly mortality statements and weekly bulletins..	49.43
Sending ozone test paper, blank registers, and other meteorological material (supplied at regular intervals) and return postage.....	23.95
Sending blanks (at regular intervals) for weekly reports of diseases, and return postage...	32.33
Sending announcements and programmes for sanitary conventions.....	40.82
Regular and special correspondence of the office, and all other postage.....	483.94
	<u>\$926.38</u>

Thus far this report has given exactly, or approximately, the kind and amount of property received, on hand, and disposed of *by this office* during the fiscal year ending Sept. 30, 1883. But in order to show exactly how much has been allowed by this board to be expended from the State treasury for all property and all other expenses during the time specified, the following statement of expenditures, classified by all vouchers allowed by this board during the fiscal year, is here presented. It includes vouchers number 759 to 893 inclusive:

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH, AS PER VOUCHERS NUMBER 759 TO 893 INCLUSIVE, ALLOWED DURING THE FISCAL YEAR ENDING SEPTEMBER 30, 1883.

Chemical analyses.....	\$37.00
Engraving, drawing, etc.....	1.10
Expenses of members. { Attending meetings.....	287.80
{ Other official.....	276.25
Instruments and books.....	630.07
Paper, stationery, etc.....	259.49
Postage. { Office.....	652.16
{ Members.....	9.45
Printing and binding.....	801.85
Secretary.....	2,000.00
Special investigations.....	40.00
Miscellaneous.....	266.69
Total.....	<u>\$5,261.86</u>

Respectfully submitted,

HENRY B. BAKER,
Secretary.

Having compared the secretary's annual report of property received, issued, expended, and destroyed during the fiscal year ending September 30, 1883, with the property book and the record of proceedings, and having examined the foregoing account of expenditures, and compared the same with the books in the Auditor General's office, I find the same to be correct.

ARTHUR HAZLEWOOD,
Committee on Finances of the Board.

Lansing, Mich., April 8, 1884.

EXPENDITURES BY THE STATE BOARD OF HEALTH IN CALENDAR YEAR 1883.

The appropriation for the board is made for the calendar year, and cannot exceed six thousand dollars (\$6,000). The following is a statement of expenditures by the board during the calendar year 1883:

CLASSIFIED STATEMENT OF EXPENDITURES DURING CALENDAR YEAR 1883.

Chemical analyses.....	\$42.50
Engraving, drawing, etc.....	1.10
Expenses of members. { Attending meetings.....	397.51
{ Other official	137.82
Instruments and books.....	798.96
Paper, stationery, etc.....	498.78
Postage. { Office.....	654.16
{ Members.....	9.35
Printing and binding.....	726.02
Secretary.....	2,000.00
Special investigations.....	25.00
Miscellaneous	215.74
Total.....	\$5,506.94

ABSTRACTS AND BRIEF ACCOUNTS OF THE PROCEEDINGS AT MEETINGS OF THE STATE BOARD OF HEALTH DURING THE YEAR ENDING SEPTEMBER 30, 1883.

REGULAR QUARTERLY MEETING AT LANSING, OCTOBER 10, 1882.

Present: Hon. Le Roy Parker, President; Rev. D. C. Jacokes, D. D., and Drs. Kellogg, Hazlewood, and Baker.

The president read his annual address. It is printed on pages 356-361 of the report for 1882.

The secretary presented his report of work in the office during the quarter; also the annual report of property for the fiscal year ending September 30, 1882, which was referred to the committee on finance. It is printed on pages xv-xxx of the report for 1882.

Communications relative to wounds by toy pistols were referred to Dr. Hazlewood, committee on accidents, etc. A paper by Dr. Hazlewood on "Toy Pistols" is printed on pages 90-94 of the proceedings of the Pontiac sanitary convention.

The secretary read a résumé of work by other boards of health.

The secretary presented letters from the secretary of the national board of health, relative to the closure of the immigrant inspection service; and was directed to communicate to the National board of health as strong argument as is possible and all facts showing the necessity for a continuation of the service at Port Huron and Detroit. His letter on the subject is printed on page 32 of this Report. Correspondence relative to the sanitary condition of cars used in carrying immigrants was also presented by the secretary.

The secretary read abstracts of correspondence relative to an outbreak of diphtheria among newly arrived immigrants in the upper peninsula, from which it appeared that the disease was probably contracted after leaving the ship.

The secretary referred to the system of prompt report of contagious diseases by the clerk of the board of health to the superintendent of schools of Grand Rapids.

It was voted that no paper hereafter read at a sanitary convention shall be published by this Board, except by a vote of the Board.

Afternoon Session.

Dr. Lyster reported progress in the preparation of his paper on "What is known of Typhoid Fever." [Printed on pages 75-90 of the proceedings at the Pontiac Sanitary Convention, in a supplement to this report.] Also in preparation of his report on "Small-Pox at Flint." [Printed on pages 397-401 of the report for 1882.]

It was voted to print in the Annual Report Mr. Parker's report of small-pox at Flint (pages 401-403 of the Report for 1882) also Dr. Mulheron's report of "Small-Pox at Flint" (pages 399-400 of the Report for 1882), and his report of "Small-pox at Portland," Ionia county (pages 404-406 of the Report for 1882).

Proposed regular correspondents were approved.

The secretary was directed to send to correspondents a circular of inquiry relative to diseases in Michigan in 1882. A compilation of replies is printed on pages 1-28.

The secretary was directed to send to health officers and clerks of local boards of health blank forms and instructions, for annual reports for 1882.

A letter from Dr. J. P. Stoddard relative to holding a sanitary convention at Muskegon was read. The committee on Sanitary Conventions was authorized to visit Muskegon, and make arrangements for a convention there. A convention was held August 23 and 24, the proceedings of which are published in a supplement to this Report.

The secretary was authorized to subscribe for journals for the library of the Board, in accordance with a list presented.

It was voted that each member of the Board who could attend be considered a delegate to the meeting of the American Public Health Association at Indianapolis, October 17-21, 1882. The members present at Indianapolis were authorized to select from their number delegates to the meeting of the Sanitary Council of the Mississippi Valley, to be held at the same time and place, and to the meeting of the representatives of boards of health, etc., with reference to a National exhibition of sanitary appliances during 1883. [Rev. D. C. Jacokes and Dr. Baker attended the meeting of the Am. Public Health Association, and Dr. Baker acted as delegate to the Sanitary Council.]

The secretary was directed to purchase Thompson's quadrant electrometer and necessary adjuncts and material.

The secretary was authorized to expend not to exceed \$200 in the purchase of books for the library of the Board.

Dr. Kellogg was requested to prepare a paper on Need for Exercise and best Methods for Exercise; also a paper on Habits and Health.

Dr. Baker presented a note on the comparative death rates in Savannah, Mobile, and Lansing, during June, 1882.

Hon. Le Roy Parker reported the preparation of a proposed bill making it a penal offense to communicate disease.

The secretary presented correspondence relative to death of cattle at the State fair, and the cause of the same.

Dr. Lyster brought up subject of a plan for small-pox hospital recommended by Dr. Wight (see Dr. Wight's paper on "How to Combat Small-pox" on pages 26-36, of the Annual Report for 1882). He said it was proposed to build one in Detroit. Referred to Dr. Baker and Rev. Jacokes with request to investigate and report at next regular meeting.

Evening Session.

Dr. Hazlewood and Mr. Parker, as special committee, reported that the committee: "Recommend that Drs. Baker and Kellogg request the return of the report submitted by them to the Board of Construction of the Northern Asylum for the Insane, and Drs. Jacokes and Lyster request the return of the report signed by them. That, as we learn from the letters of Mr. Wells, the completed plans for the building were not submitted to the Board, we will act upon the completed plans when the same may be presented to us." The report by the special committee was adopted.

Hon. Le Roy Parker and Rev. D. C. Jacokes were appointed a committee on regulation of the practice of medicine, in place of the former committee, which was discharged.

Hon. Le Roy Parker presented his report of attendance at the meeting of the American social science association, at Saratoga. It is printed on pages 328-38 of the annual Report of 1882.

The secretary mentioned an important paper on Syphonage of Traps, in the "Sanitary Engineer," N. Y., by Messrs. Bowditch & Philbrick.

Dr. Kellogg reported completion of circular of inquiry on diphtheria. [It is printed on pages 47-8 of this Report, in connection with the replies.]

The secretary was authorized to compile and publish in the annual Report replies to letters relative to communicable diseases. [Printed on pages 362-435 of annual Report 1882.]

The secretary was directed to prepare and publish in the annual Report an account of the immigrant-inspection service. [Printed on pages 436-443 of annual Report for 1882.]

Drs. Avery, Baker, and Hazlewood were appointed a committee to visit the State house of correction at Ionia, when necessary, to examine proposed plans for a building.

Bills were allowed, numbered 756-778 inclusive.

REGULAR QUARTERLY MEETING AT LANSING, JANUARY 9, 1883.

Present—Hon. Le Roy Parker, president; Rev. D. C. Jacokes, D. D., and Drs. Kellogg, Hazlewood, Avery, and Baker.

Dr Hazlewood said he had been told that much oil was sold in the western part of the State without having been inspected; that in Grand Rapids oil could be found without any brand. It was alleged that there were not inspectors enough in that part of the State properly to watch the business. Dr. Baker mentioned the charges made to the Governor about two years ago, and the arguments urged by inspectors in defense of the methods of testing a few barrels and then branding the entire lot as approved. Drs. Hazlewood and Baker were appointed a committee to take such action as might be found desirable in the interests of public safety.

The secretary read his quarterly report of work in the office; a résumé of work of other State Boards of Health; and a copy of a bill introduced by Senator Conger into the U. S. Senate, and by Hon. Mr. Rich into the House, enabling the National Board of Health to aid State and local boards of health to continue the immigrant inspections.

A letter from Hon. C. A. Gower, Superintendent of State Reform School, relative to typhoid fever in that institution, was presented.

Letters from Hon. Perry Hannah, and Mr. C. M. Wells, relative to report

on plans for the Northern Asylum for the Insane, and copies of the report of the commissioners for that asylum, for 1882, were presented.

The invitation to hold a sanitary convention at Reed City was accepted. [Proceedings of the convention held are printed on pages 163-226 of a supplement to this Report.]

The secretary presented samples of tinned-copper used in making wash-boilers and kitchen utensils, and a statement as to the use of such utensils in making "apple-butter." He presented a statement by Prof. Kedzie of the results of the analysis of samples of the tinned-copper, and also of the analysis of a sample of "apple-butter" purchased in Lansing. The tinning material was about two-fifths lead, and the "apple-butter" showed traces of lead and tin, and a faint trace of copper; also in that part next to the cover of the glass jar in which it was sent zinc was shown to be present, probably from the cover of the can. A prominent dealer in hardware, in Lansing, says he sells many such utensils for cooking fruit, and that people tell him that the tinning of the boilers is removed by using a few times for making "apple-butter."

Drs. Hazlewood and Baker were appointed a committee to investigate subject of metallic poisoning by materials for cooking and storing food, and authorized to expend not to exceed \$100 for that purpose.

A communication from Bion Whelan, M. D., health officer of Hillsdale, was presented, stating that burial permits are now required in that city.

Hon. George Howell was present and read a proposed bill "To promote the public health."

The subject of securing better vital statistics by means of burial permits was referred to the committee on legislation, with request that a bill be prepared and brought to the notice of the Legislature.

The Board voted that: The effort by local boards of health to secure better mortuary statistics by means of the system of burial permits is very commendable, and that the method is applicable to townships and villages as well as to cities.

Mr. Parker suggested that compensation for making the local record of deaths would tend to secure a better record.

Dr. Baker said that a prompt report and record was needed to increase our knowledge of communicable and dangerous diseases; and for the scientific study of the causes of sickness, as shown by the causes of deaths, a physician should be the person to make the record, in order that the record shall be correct. The whole business should be under the supervision of intelligent physicians.

Afternoon Session, January 9, 1883.

Present: Hon. Le Roy Parker, president; Rev. D. C. Jacokes, and Drs. Kellogg, Hazlewood, Avery, Lyster, and Baker.

The secretary presented a statement relative to a barber in Illinois who, by forgery and perjury, assumed the name and practiced under the diploma of a dead doctor. Also,

A list of names of persons believed to have died in Lansing, for whom a statement had not been filed with the city clerk, as the ordinance requires. Also,

Statements relative to port charges for quarantine purposes in such cities as New Orleans and New York, which have been declared unconstitutional by a court in Louisiana.

The name of a proposed correspondent of the Board was approved.

It was voted that local boards of health are recommended to supply physicians with postpaid blanks for reporting cases of diseases dangerous to the public health.

The secretary was directed to purchase a New York State board of health oil tester, and have experiments made comparing it with the Michigan tester.

Mr. Parker reported with regard to a New York law requiring a registration of plumbers, that it is good for New York, but requires more than people in small towns want.

Hon. James Hueston, of the senate, was present and spoke of the need of people for sanitary supervision of dwellings, and mentioned instances of such need.

Dr. Kellogg was requested to prepare a circular on the best method of disposing of slop-water, garbage, etc., from detached dwellings and in villages.

Mr. Parker reported relative to a proposed bill recommended by the American public health association, making it a penal offense to communicate a disease dangerous to public health, and was requested to modify the bill so that it shall specifically mention small-pox, scarlet fever, and diphtheria, and conform to Michigan statutes, and report it for further action.

Rev. Jacokes reported completion of arrangements for a sanitary convention at Pontiac. Proceedings at the convention are printed on pages 67-161 of a supplement to this Report.

After a discussion of the qualifications of medical practitioners and the importance of the subject in its relations to public health, the following resolutions were adopted.

Resolved, That there should be required of all who are to begin the practice of medicine in this State an examination as to their qualifications.

Resolved, That such examinations by the State should be restricted to questions in demonstrable knowledge as distinguished from questions of mere opinion.

Resolved, That as a public-health measure these two resolutions be referred to the president and secretary with a request that they do what they can to promote the objects of the resolutions.

The following resolution was adopted :

Resolved, That the committee on legislation and the committee on buildings, etc., jointly be requested to take into consideration the feasibility of the suggestion made at this meeting by Hon. James Hueston, M. D., for a State law requiring all plans for new dwellings to be submitted to the local board of health for approval.

A preamble and resolution were adopted relative to necessity for the immigrant-inspection service in Michigan, which are printed on page 34.

Bills were allowed, numbered 779-809, inclusive.

SPECIAL MEETING AT PONTIAC, JANUARY 31, 1883.

Held in connection with the sanitary convention. Present—Hon. Le Roy Parker, president; Rev. D. C. Jacokes, D. D., and Drs. Kellogg, Avery, Hazlewood, and Baker.

Dr. Baker presented a proposed bill relative to notices of communicable diseases, amending sections 1734 and 1735, compiled laws of 1871, to mention explicitly diphtheria and scarlet fever, and adding a section to provide compensation to physicians for such notices.

Resolutions were adopted relative to the immigrant-inspection service, which are printed on page 34.

The secretary presented a letter from H. A. Brigdon, relative to cases of sickness after eating pork. The subject was referred to the committee on foods, etc., and the secretary jointly.

The secretary presented a letter from O. D. Chapman relative to diphtheria in the Institution for the Deaf and Dumb at Flint. The secretary was instructed to write to the superintendent and ask whether he will make an explanation.

Mr. Parker reported on a letter from Prof. C. L. Ford, relative to the necessity for having several and various avenues of exit from large hotels in case of fire, and for a law requiring the same. The report is as follows:

Act No. 182, of the Session Laws of 1877, makes provision for the keeping of fire-extinguishers, a suitable fire-alarm, a night-watch, and at the head of each flight of stairs a red light; and also provides that a committee of three competent persons shall be appointed by the authorities of each town, village, or city to examine the hotels and report such recommendations as they may deem proper for the protection of guests from fire.

Section 3 provides that it shall be the duty of the authorities of each place on receiving such report to cause all needful alterations and additions or provisions necessary for the safety of guests from fire to be made within sixty days; and to direct what additions, alterations, or provisions are to be made, either by ropes furnished the sleeping-room of each guest, or by ladders and such other means as they may think best to secure the safety of the guests. A penalty of from \$25.00 to \$100 for each month is imposed upon each hotel owner or keeper so long as he shall neglect or refuse to comply with such requirements.

I am of the opinion that this act makes sufficient provision for securing the safety of guests in hotels, if only its requirements were carried out. By section 3 full discretion is given the council to cause all necessary provisions recommended by the committee for the safety of guests, to be made. This discretion is a very wise one, and if properly exercised would no doubt afford very full protection to guests in hotels. The trouble with this and so many other of our laws which are enacted for the preservation of the life, health, and comfort of the public, is that they are so rarely enforced. We have laws enough, but not enough enforcement. I can hardly support an addition to this act so far as it relates to hotels, unless it may be to specify more particularly what changes and additions shall be made in every hotel. As for instance adopting the suggestion of Prof. Ford to require various avenues adequate to the safe escape of guests and employees, in addition to stairways and elevators. These in most cases of fire are the first passages to be barred by the flames. The law should require in all cases, sufficient outside fire escapes, so that if the stairways and elevator ways are blocked, persons can escape from the windows to the ground.

Act number 226 of the Session Laws of 1879, as amended by act number 41, of the Session Laws of 1881, makes provision for the examination of all buildings, stands, etc., used for the assemblage of people, by a board of building inspectors, with reference to the condition, strength, and safety of such building. Such examination is, however, to be made upon the request of the owner, or person having control of the same. It very frequently occurs that the owner will make no such request, and the board of inspectors will be slow to act until such request is made. It is true a penalty is imposed for neglect to secure a certificate from the board of inspectors that the building is sufficiently provided with means for speedy and safe egress in cases of danger and sudden alarm, but we know that this statute is violated by a large majority of the owners of buildings for public assemblage, every day in the year.

This act should provide for other buildings than those for public assemblages, such as factories, large buildings used for offices. It should also specify distinctly what sort of means of escape must be provided and require more than one. A broad stairway may be sufficient for most occasions of egress from a theater or church, but in case of fire this may be closed and escape thus cut off.

The two acts I have mentioned should be consolidated into one, and that one be made more comprehensive than either of the statutes mentioned.

Perhaps the Legislature will amend them or pass a new bill.*

Very Respectfully,

LEROY PARKER.

Flint, January 19, 1883.

The terms of office of Hon. LeRoy Parker and Rev. D. C. Jacokes, D. D.,

*[The Legislature in 1883 passed an act which was approved by the Governor (No. 170 of 1883) entitled: "An act to provide for the construction of fire-escapes from hotels, boarding and lodging houses, also to afford the necessary escape from fire in business places, and in buildings used for public and private assemblages." But the act does not specify distinctly the nature of the fire escape. It does not even require that it shall be outside the building. The act makes it the duty of the building commissioners to inspect at least once every year all such buildings as specified, and to report to the township or village board. It would probably be well to have the local board of health in every township, city, and village, distinctly charged by law with the duty of enforcing such provisions for the public safety.—H. B. B., Sec. S. B. of H.]

being about to expire, resolutions of appreciation and esteem were adopted, as follows:

Resolved, That this Board wishes to express to Hon. LeRoy Parker its high appreciation of his labors as a member and as president of the Board, and as its committee on legislation in the interests of public health.

Resolved, That the cordial thanks of this Board are hereby tendered to Rev. D. C. Jacobes, D. D., for his valuable work as a member of the Board, including also his efforts for a successful sanitary convention at Pontiac.

Dr. Hazlewood presented a translation into the Holland language of the document on prevention and restriction of small-pox, which was ordered electrotyped and printed.

Bills were allowed numbered 810-820 inclusive.

REGULAR QUARTERLY MEETING AT LANSING, APRIL 10, 1883.

Present: Drs. Avery, Hazlewood, Tyler, and Baker.

The secretary presented quarterly report of work in the office, also *résumé* of work of other State Boards of Health. Also—

A reply from the superintendent of the Institution of the Deaf and Dumb relative to diphtheria, and the Chapman boy. Also—

A statement relative to small-pox at Providence, R. I., New Orleans, La., and Nashville, Tenn. The secretary was instructed to correspond with the Chicago Board of Health, and the National Board of Health, with reference to what can be done by quarantine and inter-State inspection to prevent introduction of small-pox into Michigan.

The secretary was authorized to send to health authorities in vicinity of health and pleasure resorts in Michigan information of the existence of small-pox in places whence some of the patrons of such resorts come; also to send the same to health officers of cities especially exposed to introduction of small-pox. The warning sent is printed on pages 104-105.

The secretary presented correspondence with Prof. Burrill, of the Illinois Industrial University, relative to a sample of the pork which caused sickness reported by Mr. Brigdon, of Montmorency county. Also—

Newspaper slips relating to convictions in Grand Rapids for sale of diseased meats. Also—

Statement of his attendance as an expert witness on a prosecution in Farmington, Oakland county, for failure by a physician to report cases of scarlet fever.

Afternoon Session, Lansing, April 10, 1883.

Present, Drs. Avery, Hazlewood, Tyler, and Baker.

The secretary presented a statement concerning a legislative memorial sent in his care, signed by nearly one hundred physicians of Detroit, relative to compensation of physicians for reporting cases of diseases dangerous to the public health.

Prof. R. C. Kedzie, being present, reported verbally relative to his attendance as a representative of this Board at the meeting of the Sanitary Council of the Mississippi Valley at Jackson, Miss. He stated that all the States in the Council except Kentucky, ten in all, were represented; also that there were delegates from several sanitary organizations. The aim was to do what is possible to protect the health of the valley with the least necessary disturbance to travel and commerce. The Council formulated resolutions, and outlines of methods. The sanitary inspections of travel by rail and river were to be maintained as heretofore. The President of the United States was

asked to place the \$100,000 epidemic-fund at disposal of the National Board of Health. If found necessary delegates present pledged some of the States for funds to maintain the system of inspection and notification relative to dangers to health in the Mississippi Valley. A vote of thanks was tendered to Dr. Kedzie for his representation of this Board in the meeting, and he was requested to write out his report for publication in the Annual Report of the Board.

Hon. John Avery, M. D., of Greenville, was elected President of the Board.

The secretary presented copy of a Senate bill for protection of railroad employees from danger by switch-frogs, guard-rails, etc. He stated that he had recently inspected a yard in Detroit, in charge of Div. Supt. T. J. Charlesworth, where there was in use a better means of protection than the wood-blocks recommended in the bill, namely, a tamping of coal ash and cinders. By this tamping greater protection is afforded the workmen, with less danger to trains. The secretary was instructed to communicate to the Senate committee on railroads a statement of the advantages of the coal-ash tamping over the wood-block.

The secretary presented a classified statement of deaths caused by the Newhall fire, in Milwaukee, Wis.

The secretary was directed to prepare a blank for use of local boards of health in reporting diseases dangerous to the public health. Such blanks are printed on pages 81-83.

The names of proposed correspondents of the board were presented and approved.

The secretary was directed to arrange for a sanitary convention at Muskegon. Proceedings of the convention are printed on pages 1-65 of a supplement to this Report. The invitation to hold a sanitary convention at Ionia was accepted.

Dr. Tyler was asked to attend for the Board the meeting of the State Medical Society at Kalamazoo. Dr. Hazlewood was asked to attend for the Board the meeting of the American Medical Association at Cleveland.

The secretary was instructed to purchase for the library the transactions of the American Medical Association for 1882, because of its summary of the public health laws of the several States.

The by-laws were amended to make the committee on sanitary survey consist of one member instead of three.

The president announced and the Board confirmed nominations of standing committees. [Printed on pages vii-viii.]

Dr. Baker, as committee on diseases of animals, etc., reported that representations had been made before a meeting of members of the Senate and House committees on public health and on agriculture, by Hon. Isaac Marston, of the necessity for an appropriation to enable the State cattle commission to do the work for which it was appointed in preventing the introduction and spread of contagious diseases in cattle and other animals, and the consumption of diseased meat. Mr. R. L. Hewitt and Dr. Baker had also addressed the meeting on this subject. It was the understanding that Senator Monroe would see a bill prepared embodying views presented. A bill had been introduced into the House.

Dr. Tyler called attention to a bill before the Legislature to prohibit throwing sawdust into streams. The subject was discussed at some length, and while it seemed impracticable to prevent the use of streams and lakes for running and storing of logs, the opinion prevailed that it was entirely practi-

cable and desirable that sawdust should be kept out of streams, ponds, and lakes.

Dr. Baker presented diagrams relating to typhoid fever, showing that the common belief that it is not fatal at ages above forty years is an error due to overlooking the fact of the smaller proportion of inhabitants at such older ages.

Dr. Hazlewood reported on the apparent disregard in some cases of the law for inspection of illuminating oils. He had not observed that the brand was properly erased from empty barrels collected in Grand Rapids, and he believed the subject was not closely attended to there. He had seen newly invoiced oil where the date of branding the barrel was very indistinct so that it might pass for almost any date.

The secretary was directed to prepare a memorial to the president of the United States, strongly petitioning him to place at the disposal of the National board of health the \$100,000 epidemic fund; send it to members of the Board for signature, and send it, when signed by them, to the president. The memorial, signed by all the members of this Board except Dr. Kellogg, who was in Europe, was sent to the president, as follows:—

MICHIGAN STATE BOARD OF HEALTH.
Office of the Secretary, Lansing, Michigan, April 19, 1883. }

To His Excellency, Chester A. Arthur, President of the United States, Washington, D. C.:

SIR: The Michigan State Board of Health respectfully represents and memorializes your Excellency as follows:

Whereas, The National Board of Health is the only national authority which has by its public-health work, and especially by its system of immigrant-inspections, gained the confidence of the sanitarians and public-health officials of this State, therefore,—

The Michigan State Board of health earnestly prays your Excellency to place the contingent appropriation of \$100,000, or so much thereof as may be needed, in the hands of the National Board of Health, to continue the immigrant-inspection, and to add such an inspection of inter-state travel as will tend to prevent the contagium of small-pox, now present at New Orleans, Nashville, and Saint Louis, from being carried northward, and the disease from thus becoming generally epidemic in this and other northern States, which many southern people visit at this time of the year.

Believing, as we do, that the methods employed by the National Board of Health will be especially applicable to the prevention of epidemics of cholera and yellow fever, in case either of those diseases reach this country, as is now feared may occur during the coming season, and having full confidence in the abilities of the officers and members of the National Board of Health, these are further reasons why we earnestly petition you to place the epidemic fund, or so much thereof as may be necessary, at the disposal of the National Board of Health, to the end that epidemics now threatened may be prevented.

[Signed.]

Very respectfully,

HENRY F. LYSTER, M. D., Detroit.

VICTOR C. VAUGHAN, M. D., Ann Arbor.

JOHN AVERY, M. D., President, Greenville.

C. V. TYLER, M. D., Bay City.

ARTHUR HAZLEWOOD, M. D., Grand Rapids.

HENRY B. BAKER, M. D., Secretary, Lansing.

[In this connection it is proper to print the following memorial to Congress on the subject of immigrant inspection, forwarded in July, 1882:

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY, LANSING, MICHIGAN, July 12, 1882. }

To the Honorable the Senate and House of Representatives in United States Congress assembled:

Your memorialist, the Michigan State Board of Health, respectfully represents:

That small-pox, diphtheria, and scarlet fever have been and are being repeatedly introduced into this State by immigrants newly arrived from foreign infected places, and by travelers who have come in contact with such immigrants; that because of the rapidity of travel and the vast amount of inter-state travel it is impossible for State or local boards of health, without extraordinary interference with inter-state commerce, to successfully quarantine against or effectually control these diseases while the United States government permits one or more of them to be introduced so frequently as of late, by immigrant vessels which reach this country; that while in ordinary years the introduction of scarlet fever and diphtheria is believed to be of exceeding consequence in causing epidemics, in swelling the death-rates, sickness-rates, pauperism, and general suffering, cholera and yellow fever are sometimes thus introduced, and at the present time

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small-pox is causing especially wide-spread disaster in this and other western states; that by reason of such introduction of diseases the lives, health, and happiness, those dearest and most important interests of our people, are constantly destroyed or placed in imminent danger from those foreign pestilences from which it is entirely possible for the United States government to afford protection; that we believe that it is the highest duty of a government to protect the lives of its citizens from dangers which threaten all, and from which no other than governmental protection is adequate; that it is with deepest apprehension that this State Board of Health learns that by reason of insufficient provisions in the Sundry Civil Service Appropriation bill, for the National Board of Health, the important work which that board has lately commenced and is expected to do is likely to be crippled; that this board believes that now more than ever before is a most inopportune time to lessen in any way the activity and usefulness of the National Board of Health, believing as this board does that there is no other governmental department, bureau, or "service" so closely connected with the highest interests of all citizens and of humanity.

Therefore, this State Board of Health earnestly prays Congress to grant sufficient appropriations to the National Board of Health, and to make such other provisions as will enable it to continue the immigrant-inspection service at all important ports of entry, and on important lines of travel, and to provide, in every possible way for the protection of the whole country from cholera and yellow fever, and also from those contagious diseases hereinbefore mentioned, which are well known as causing the most deaths and distress throughout the greater portion of this country.

By direction and on behalf of the Michigan State Board of Health.

[Signed] LE ROY PARKER, *President*.
HENRY B. BAKER, *Secretary*.]

Bills were allowed, numbered 821-840 inclusive.

ADJOURNED MEETING,—AT REED CITY, APRIL 27, 1883.

Held in connection with the sanitary convention. Present: Hon. John Avery, M. D., president, and Drs. Vaughan, Hazlewood, and Baker.

The subject of an alleged tannery nuisance at Fremont, which had been described before the convention, was presented; and the president was requested to visit Fremont and advise as to abatement of the nuisance. A report of the visit and its result is printed on page 30.

Bills were allowed, numbered 841-849 inclusive.

REGULAR QUARTERLY MEETING, AT LANSING, JULY 10, 1883.

Present: Hon. John Avery, M. D., president; and Drs. Hazlewood, Vaughan, and Baker.

The president presented correspondence with Ephraim Follet, Esq., of Montcalm county, relative to flooding of lands in that county. The correspondence is printed on pages 28-29.

The secretary presented quarterly report of work, also a résumé of work of other State Boards of Health, and a statement relative to recent public-health legislation in Minnesota. Also—

A statement of laws passed by Michigan Legislature in 1883 relating to public health. [Printed on page 116.]

The name of a proposed correspondent of the Board was approved.

The by-laws were amended to make the auditing of bills the first order of business after the reading of minutes.

Instructions were given to the secretary as to printing proceedings and addresses at sanitary conventions.

Afternoon Session, July 10, 1883.

Present: The president, Dr. Avery, and Drs. Lyster, Hazlewood, Vaughan, and Baker.

The secretary was authorized to revise and reprint the circular (55) on Work of Health Officers and Local Boards of Health. The revised circular (64) is printed on pages 67-78.

PROCEEDINGS OF THE BOARD—ABSTRACT OF MINUTES. . xxxix

The secretary was authorized to have a telephone placed in the office, to facilitate communications with members of the Board and with officers of local boards of health.

Plans (not complete in all cases) for buildings at the School for the Blind, at Lansing; at the Michigan Asylum for the Insane, at Kalamazoo; at the State Public School, at Coldwater; and at the State Industrial Home for Girls, at Adrian, were examined and discussed. Results of the examinations are stated on pages 117-120. Some of the plans had, previously to the meeting, been examined by the committees, which reported at this time.

The following resolution was adopted:

Resolved, That the committee on "buildings, including ventilation, heating, etc.," be requested to report upon the construction of hospitals appropriate for State institutions.

Evening Session, July 10, 1883.

Present—The president, Dr. Avery; and Drs. Hazlewood, Lyster, and Baker.

Plans for a building at the State Industrial Home for Girls, at Adrian, were further examined. The results are stated on pages 119-120.

The secretary presented a circular by Dr. Marshall, health officer of Lansing, relative to contagious diseases, and stated that the Lansing city board of health had adopted Act No. 11, of 1883, as regulations to take immediate effect.

Bills were allowed, numbered 850-881 inclusive.

SPECIAL MEETING AT MUSKEGON, AUGUST 24, 1883.

Held in connection with the sanitary convention. Present—Hon. John Avery, M. D., president; and Drs. Lyster, Vaughan, and Baker.

Plans for a building at the institution for the Deaf and Dumb at Flint were presented and examined. The result is stated on page 120.

Bills were allowed, numbered 882-889 inclusive.

SPECIAL REPORTS, COMMUNICATIONS, ETC.

A summary of special reports relative to certain communicable diseases, is printed on pages 79-110.

TYPHOID FEVER INVESTIGATED BY LOCAL BOARD OF HEALTH.

In December, 1882, Thomas Smith, health officer of Chocoday township, Marquette county, reported cases of typhoid fever in the family of Mr. J., on account of which an examination as to the cause had been ordered by the township board of health, which had been made by Drs. Desjardin and Theil, of Marquette. They did not find the water contaminated, but found that the first member of the family taken sick had been away from home several times just before his illness; and that there were cases of typhoid fever at Marquette and other places at that time; also that the banks of a creek directly back of the house were sometimes flooded and sometimes left dry with a deposit of sawdust exposed to the sun, giving rise to a foul smell of which the family had complained. Drs. Desjardin and Theil thought it probable that the first case got the infection away from home; and that, as the discharges from the first case were thrown into a privy-vault, without disinfection, the second case derived the infection from the first.

PETITION FOR ABATEMENT OF AN ALLEGED NUISANCE,—POWERS AND DUTIES OF BOARDS OF HEALTH.

In August, 1883, a petition was received for the abatement of an alleged nuisance caused by throwing sawdust and other mill refuse into the Little Muskegon river, at Morley. It is a sample of many communications that have been received relating to sawdust in streams, overflowed lands, slaughter-houses, privies, etc., and it is published here with comments in order to call attention to the proper course of procedure in such cases. An answer to the petition was sent to the first signer, at Morley, but as the postoffice address of none of the signers was given it is not certain whether it reached him. The petition is as follows:

To the State Board of Health of the State of Michigan:

We the undersigned, freeholders and residents, residing in the vicinity of what is known as the Little Muskegon River, below the village of Morley, Mecosta county, Michigan, do ask your honorable body, that you give attention and abate or estop the firm of Higbee & Hugh (saw-mill owners), on said river, at the said village of Morley, from running or throwing into said river all the sawdust and waste from their saw and planing-mill, for the following reasons, to wit:

1. We consider it a nuisance.
2. It obstructs the channel of said river.
3. The odor and stench from the said river is becoming unbearable and very unhealthy for all residents along said stream, by reason of decaying of said waste, refuse stuff, and sawdust being run into said river as above set forth.
4. The attention of proper township officers has been called to said nuisance several times, and in each case they claim to have no authority in the matter.
5. Much sickness has prevailed for many months past in nearly all the families residing near said river, and we attribute the cause to decaying substance along the banks of said river.

[Signed.]

A. C. MCCONNELL,
C. L. RICHARDSON,
GEO. GRONER,
S. A. CORNELL,
G. MAXLEY,
ALLEN BRUCE,
SOLOMON JOHNSON,
F. A. VOICE,
F. M. RUMBAUGH,

JOHN WEBER,
W. RANSON,
GEORGE DOXTABE,
M. DENOY,
F. WATERS,
WM. W. WATERS,
ELI DAVIS,
JOHN WATERS,
FITCH FIFE,

NATHAN STOWERS,
F. S. MAXON,
D. H. PINGOE,
MELLEON MITTIS,
IRA HALL,
LAWRENCE SOUES,
REUBEN J. WEBER,
JOHN W. TURBS,
GEORGE DOSCH.

The power and the duty to make regulations respecting nuisances, sources of filth, causes of sickness, and respecting articles capable of containing or conveying any infection or contagion, or of creating any sickness, is by sections 1694 and 1695 of the Compiled Laws of 1871 (§1635 and 1636 of Howell's Annotated Statutes) conferred upon township boards of health. By section 1740 of the Compiled Laws of 1871 (§1681 of Howell), as amended by act 145 of 1879. This power and duty is also imposed on city and village boards of health where charter provisions do not conflict therewith. The board of health is required to give notice of its regulations, by publication in a newspaper or by posting, as provided in section 1698 of Compiled Laws of 1871.

Section 1699 (C. L. 1871) requires said boards of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion be injurious to the health of inhabitants, and destroy, remove, or prevent the same as the case may require.

When such nuisance, source of filth, or cause of sickness is found on private property, the board of health is required, by section 1700, to notify the owner or occupant to remove the same at his own expense within twenty-four hours. If he neglects to do so he shall forfeit a sum not exceeding one hundred dollars.

If the owner or occupant shall not comply with such order of the board of

health, said board may, by section 1701, cause the said nuisance, source of filth, or cause of sickness to be removed at the expense of the owner or occupant, or of such other person as shall have caused or permitted the same.

Sections 1703 and 1704 provide for a forcible entry of private property, and a summary destruction, removal, or prevention (by a sheriff or constable acting under direction of members of the board of health, and by authority of a warrant issued by a justice of the peace) of a nuisance, source of filth, or cause of sickness found thereon, whenever entry is refused and the board of health think such proceeding necessary for the preservation of the lives or health of the inhabitants.

Section 1702 provides that when a person shall be convicted on an indictment for a common nuisance that may be injurious to the public health, the court may in its discretion, order the nuisance to be removed or destroyed, at the expense of the defendant, under the direction of the board of health, and by authority of a warrant to the sheriff or other officer.

Act No. 136, Laws of 1881, empowers boards of health in townships and villages to make such rules and regulations in relation to the care and cleansing of privies and water-closets as they may deem desirable for the preservation of the health of any of the inhabitants thereof; and to declare any privy or water-closet a nuisance and order and enforce the abatement thereof.

Act No. 232, Laws of 1879, prohibits, under a penalty of not less than twenty nor more than one hundred dollars, the keeping or maintaining of a slaughter-house, slaughter-yard, slaughter-pen, or any other place for slaughtering [butchering] or killing any animals, or rendering any dead animals as a business, within twenty rods of any public highway within any township.

Section 1737 gives to the board of health of every township, to the president and trustees or council of every village, and to the mayor and aldermen of every city discretionary authority to assign places for the exercising of trades or employments offensive to the inhabitants or dangerous to the public health, and to forbid the exercise thereof in places not so assigned, and to revoke such assignments; and requires all such assignments to be entered in the records of the township, village, or city.

When any place or building so assigned shall become a nuisance by reason of offensive smells or exhalations, or shall become otherwise hurtful or dangerous to the neighborhood or to travelers, and when the same shall be made to appear on a trial, or by the admission of the person exercising such trade or employment, before the circuit court for the county, upon a complaint made by the board of health, or by *any other person*, said court may revoke such assignment and prohibit the further use of such place or building for the exercise of either of the aforesaid trades or employments, and may cause such nuisance to be removed or prevented; this is provided for in section 1738.

Section 6373 provides that in actions on the case for a private nuisance, when the plaintiff prevails he shall, in addition to the usual judgment for damages and costs, also have judgment that the nuisance be abated and removed, unless the circuit court judge before whom the case was tried shall certify in the minutes of the trial that the abatement thereof is unnecessary. Sections 6374-6376 make provision for the abatement of such a nuisance when a judgment for its abatement is rendered.

Section 6377 gives the circuit court for any county *equity* jurisdiction in all matters concerning nuisances, where there is not a *plain, adequate, and complete* remedy at law; and authorizes the circuit court to grant injunctions to stay or prevent nuisances.

The foregoing provisions of law are qualified by the general principles that declaring a thing to be a nuisance does not make it a nuisance if it is not one in fact (*Van Horn v. People*, 26 Mich., 221, 226); and that property is not to be destroyed until its destruction is lawfully ascertained to be necessary in order to stop the nuisance, and then no more is to be destroyed than is thus determined to be necessary to effect that object (*Shepard v. People*, 40 Mich., 487); also that where a nuisance arises from the use of things innocent in themselves, the case calls not for the destruction of the innocent things but for a discontinuance of the objectionable use of them. (See *Messersmidt v. People*, 46 Mich., 437.) Hence when a nuisance is such that its abatement will involve the destruction of private property, and the owner does not regard the order of the board of health to abate it, and when the danger to life or health is not so great as to admit of no delay, it is generally the better, as well as the safer course, for the board of health to enter complaint before a court, and secure a judicial order for the abatement of the nuisance including the necessary destruction of property.

When the nuisance is a public nuisance, a violation of a public right, it is the duty of the board of health to make complaint for its abatement, even though there be but few persons who suffer therefrom. But when it is merely a violation of a private right, as the building of a house with eaves projecting over the lands of another, it belongs to the person injured to defend his right.

The board of health should not neglect its duty in regard to making complaints for abatement of a nuisance. But before making complaint it would be well for it to order the nuisance abated, in accordance and in compliance with section 1700, Compiled Laws of 1871. If the board of health refuses or neglects to make the proper complaint for abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for abatement of the nuisance as a public nuisance or for damages by reason of the nuisance as a private nuisance and for abatement of the same.

The State Board of Health has no authority to enforce or order the abatement of a nuisance. Its powers in this respect are advisory. And while the Board is willing to render such advice as it may be able to give on any subject, it is often the case in regard to nuisances that prosecuting attorneys, or other lawyers, on the ground and acquainted with the facts, are in better position to give legal advice than is the State Board of Health, especially as there is now no lawyer upon the board. The State Board of Health is always glad to learn of the efforts of local boards to abate nuisances, and what success attends those efforts; and solicits correspondence upon this subject. It cannot, however, undertake to do for local boards that which the law has so well provided for their doing for themselves. In showing them how they can help themselves it really does more for them than to do their work; for when the local board has mastered the situation and removed a nuisance, it has secured a vantage ground which a distant authority could not so well secure and hold.

A discussion of the subject of powers and duties of local boards of health, by Hon. Le Roy Parker, of Flint, formerly president of the State Board of Health, is printed on pages 291-300 of the Report of this Board for 1879.

This Eleventh Annual Report is respectfully submitted.

HENRY B. BAKER,
Secretary.

DISEASES IN MICHIGAN IN THE YEAR 1882.

**A Summary for the State, Compiled in the Office of the Secretary
of the State Board of Health, from Replies* by Regular
Correspondents of the Board.**

The study of diseases in Michigan by means of replies to circulars similar to this, has been carried on in this office for each of the eight years, 1875-82. Circular 59, of the replies to which this is a compilation, was very much like its predecessors, except that some questions relating to the relative prevalence of diseases, and the coincident meteorological conditions, were omitted because the subjects to which they referred are so much more elaborately treated in the articles on "weekly reports of diseases in 1882," and on the "principal meteorological conditions in Michigan in 1882," which appear further on in this volume. Circular 59 was issued to correspondents in December, 1882, and 27 replies, representing 26 localities, were received. Much praise is due to those correspondents who replied to the circular. It is to be regretted that the number of correspondents heard from in response to this circular is not much greater than it is. However, we may be thankful for what we have, which is much better than no information. The compilation has been as carefully made as though the responses were more numerous. The replies are printed in full following the summary. The replies are summarized, the summaries following each question. The circular and the summaries of replies interspersed are as follows:—

CIRCULAR TO CORRESPONDENTS, RELATIVE TO DISEASES IN [59] MICHIGAN IN 1882.

OFFICE OF THE STATE BOARD OF HEALTH, }
LANSING, MICHIGAN, December, 1882. }

To the Correspondents of the State Board of Health,—

GENTLEMEN:—This Board desires to have, and to place upon record for purposes of future study and comparison in connection with records of deaths and of meteorological conditions, statements for as many different localities in the State as possible of the diseases in Michigan during the year 1882. Will you have the kindness to send, as soon as is convenient, and on this sheet, your replies to the following questions? So far as exact and generally accepted common terms can be used, it is desirable to avoid the use of technical terms. Please use the stamped envelope enclosed herewith, and leave all additional postage to be paid at this office. In replying, it is desired that you fill the blanks in this Circular; if the blank space is not sufficient for your answer, please refer to and use an extra sheet, referring to the question by number.

THE ESTIMATED DEATH-RATE IN MICHIGAN IN 1877-81.

1. *If you live in a city or incorporated village, what do you estimate the number of inhabitants of said city or village at the middle of the year 1882?*
2. *Among these inhabitants above mentioned, what do you estimate the number of deaths from all causes during the year 1882?*

*The replies are printed in full on pages immediately following the summary.

Replies were received to these questions from both city and country districts. Replies were received to question 1, giving a known or estimated population, for 6 cities (1 including the vicinity), 13 villages (9 including the vicinity), and one reply representing three townships. Replies to question 2 giving the known or estimated number of deaths in 1882 were received from 5 cities, 12 villages, and 2 country districts. Replies to both questions 1 and 2 were received from 5 cities, 12 villages, and 2 country districts. From these 19 localities having a known or estimated population of 170,100 a total number of 3,104 deaths were reported, making an annual death-rate of 18.25 in 1,000 inhabitants. The highest death-rate was at Fayette (three townships—Fairbanks, Nahma, Sack Bay, Delta county), being 18.8, and the lowest was at Union City, being 5.71 per 1,000 inhabitants. The following table exhibits the replies received to questions 1 and 2 from each locality, and the death-rate per 1,000 population as calculated from the population and the number of deaths reported. The table on page 3 gives a comparative exhibit of the death-rate as reported, in reply to similar questions, for the years 1877–1882.

TABLE—Exhibiting Names of Localities from which Replies to Questions 1 and 2 were Received, the Estimated Population, the Number of Deaths Reported, and the Average Deaths per 1,000 Persons Living, for each Locality, for the Year 1882:

DIVISIONS AND LOCALITIES.*	City, Village, or Township.	Estimated Population.	Deaths Reported.	Deaths per 1,000 Persons.
UPPER PENINSULAR DIVISION.*				
Central Mine.....	Township.....	1,300	13	10
Fayette.....	Three Townships.....	800	15	18.8
WESTERN DIVISION.*				
Ilersey.....	Village and Vicinity.....	500	5	10
CENTRAL DIVISION.*				
Greenville.....	City and Vicinity.....	3,500	35	10
Lyons.....	Village.....	800	—	—
Otisville.....	Village and Township.....	1,600	20	12.5
St. Johns.....	Village.....	2,600	30	11.5
Vermontville.....	Village.....	700	8	11.4
Woodland.....	Village and Vicinity.....	300	2	6.67
SOUTH-WESTERN DIVISION.*				
Niles.....	City.....	5,300	79	14.9
Otsego.....	Village and Vicinity.....	1,000	11	11
Pokagon.....	Village and Vicinity.....	800	8	10
St. Joseph.....	Village and Vicinity.....	4,000	57	14.25
SOUTHERN CENTRAL DIVISION.*				
Hillsdale.....	City.....	4,000	35	8.75
Hudson.....	Village and Vicinity.....	2,300	14	6.09
Mendon.....	Village and Vicinity.....	900	6	6.67
Union City.....	Village.....	1,400	8	5.71
Union City.....	Village and Vicinity.....	1,500	12	8.
Ypsilanti.....	City.....	6,000	—	—
SOUTH-EASTERN DIVISION.*				
Detroit.....	City and Suburbs.....	135,000	2,700	20
Northville.....	Village.....	1,000	9	9
Wyandotte.....	City.....	3,500	50	14.3

*For counties in each division, see Exhibit 1, page 5.

3. Please state the territory for which your replies to the following questions are made?

The replies received include observations from 6 cities, 15 villages, and 5 country districts. Many of the villages include portions of the townships surrounding them. The territory is situated in 20 counties and 7 geographical divisions of the State. A list of these divisions with the counties in each division is printed in Exhibit 1, page 5.

TABLE—Exhibiting the Estimated Population, the Estimated Number of Deaths, the Average, Highest, and Lowest Death-rates, and the Number of Localities in Michigan Represented by Replies from Correspondents for the Years 1877, 1878, 1879, 1880, 1881, and 1882 :—(See questions 1 and 2, and the following paragraph on pages 1-2.)

	YEARS.					
	1877.	1878.	1879.	1880.	1881.	1882.
Number of Localities represented..	28	39	23	26	31	19
Total estimated population.....	218,980	285,867	202,329	210,176	241,584	170,100
Estimated number of deaths.....	3,393	3,749	3,272	3,430	4,524	3,104
Average deaths per 1,000 persons....	15.50	13.10	16.17	16.32	18.74	18.25
Highest death-rate reported*.....	40.00	25.00	33.33	25 00	†29.63	18.8
Lowest death-rate reported*.....	1.00	3.70	3.33	2.50	1.8	5.71

*Number of deaths in each year in each thousand persons living.

†Death-rate large because of Diphtheria. On pages 283 and 284 of the Report for 1882, the highest death-rate reported for 1881 should have been 29.63, at Hastings; the population of Otisville and Forest township should have been about 1,600, and the death-rate 12.5 instead of 40.

SICKNESS IN 1882, AS COMPARED WITH 1879, 1880, AND 1881.

4. Among the people of your locality, considering the increase or decrease of population, was the amount of sickness from all causes during the year ending December 31, 1882, greater, less, or about the same as the average during previous years? If not the same, how much was it increased or diminished?

Each of the 27 correspondents who replied to the circular, replied to this question. Four correspondents thought the sickness had increased, and 16 that the sickness had decreased, and 7 that it was about the same. Of the 4 who reported the sickness increased, one said it had increased 300 per cent, one that it had increased 100 per cent, one that it was "rather more," and one that there was a slight increase. From the exceptional amounts of increase reported by the two correspondents it would be an unfair showing to say the average increase of sickness was 200 per cent. The increase of 300 per cent in sickness was in a mining location, and was caused by overcrowding consequent upon the arrival of a large number of immigrants. The 100 per cent increase was due to the prevalence of diphtheria.

Of the 16 who reported the sickness decreased, 3 said it was 50 per cent less; 2, 33 per cent less; 3, 25 per cent less; 1, 20 per cent less; 2, 17 per cent less; 1, 12 per cent less; 2, "less;" 1, "little less;" 1, "rather less;" an average decrease of 30 per cent. Comparing the year 1882 with other years: Of the correspondents who replied to this question for each year mentioned, the proportion which reported an increase of sickness was,—in 1879, 29 per cent; in 1880, 20 per cent; in 1881, 43 per cent; and in 1882, 14.8 per cent. The proportion which reported a decrease of sickness in each year was,—in 1879, 39 per cent; in 1880, 20 per cent; in 1881, 17 per cent; and in 1882, 59 per cent. The proportion of those who reported the sickness about the same as in previous years was,—in 1879, 33 per cent; in 1880, 59 per cent; in 1881, 40 per cent; and in 1882, 25.9.

It appears from these figures that there was less sickness reported by correspondents in Michigan in 1882 than in either of the years 1879, 1880, or 1881. This subject is dealt with in the article on Weekly Reports of Sickness in Michigan, in another part of this volume.

DEATH-RATE IN 1882 COMPARED WITH PREVIOUS YEARS.

5. Compared with previous years, and from all causes, was the ratio of deaths to inhabitants during the year 1882, greater, less, or about the same as the average? If not the same, how much was it increased or diminished?

Twenty-six correspondents replied to this question. Twelve said the death-

4 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1883.

rate had decreased, eight that it was about the same, and six that it had increased. Of those who reported it decreased, 3 said 50 per cent (or nearly 50 per cent); 1 said 30 or 35 per cent; 1, 28 per cent; 4, 25 per cent; 1, 20 per cent; 1, 18 per cent; and 1, 10 per cent. Of those who reported it increased, 1 said it was nearly doubled; 1, 60 per cent; 1, 25 per cent; 1, 21 per cent; 1, 20 per cent; and 1, 5 or 10 per cent.

DISEASES MORE THAN USUALLY PREVALENT IN 1882.

6. *What diseases, or causes of death, were more prevalent in 1882, than usual in previous years?*

Twenty-five correspondents replied to this question, ten of whom said that no disease was more than usually prevalent. By the other 15 correspondents who replied to the question, the following diseases and causes of death were reported as more than usually prevalent in 1882:—

Diphtheria, by 6; scarlet fever, by 4; typhoid fever, by 3; apoplexy, accidental, bronchitis, congestive attacks during latter part of winter and early spring, catarrhal diseases, consumption, diarrhea, diseases of the heart, diseases peculiar to old age and to infants, influenza, lung diseases, measles, old age, rheumatism, vaccinia, and whooping-cough, each by one.

In 1877, 6 correspondents reported diphtheria as a disease of increased prevalence; in 1878, 15; in 1879, 8; in 1880, 6; in 1881, 14; in 1882, 6. Scarlet fever was reported as being of increased prevalence, in 1877, by 6; in 1878, by 6; in 1879, by 2; in 1880, by 5; in 1881, by 4; and in 1882, by 4.

A tabular view of the replies to this question is given in Exhibit 2, on pages 6 and 7.

7. *If you can assign any cause for the unusual prevalence of any disease, please do so.*

But 10 correspondents replied to this question, which are embodied in Exhibit 2, pages 6 and 7.

8. *What diseases, or causes of death, were less prevalent in 1882 than usual in previous years?*

Twenty-seven replies were received to this question, one stating that no disease was less prevalent in 1882 than in previous years. By those who reported some disease or cause of death as less prevalent, the following were reported by the number stated:—

Malarial diseases, by 7; measles, 5; diphtheria and pneumonia, each by 4; fevers, intermittent fever, scarlet fever, and typho-malarial fever, each by 3; bowel diseases and typhoid fever, each by 2; accidental, all acute diseases, bilious fever, consumption, congestive diseases, cholera morbus, cholera infantum, diarrhea, dysentery, inflammatory diseases, remittent fever, and whooping-cough, each by one. One said he could not name any.

A tabulated abstract from the replies is shown in Exhibit 2, pages 6 and 7.

9. *To what do you attribute the lessened prevalence?*

Nineteen replies were received to this question. An abstract is shown in Exhibit 2, pages 6 and 7.

MORTALITY IN MICHIGAN IN 1882.

10. *From what diseases or causes was there more than the usual mortality during the year 1882?*

Twenty-four correspondents replied to this question, of whom 11 said that no disease was there more than the usual mortality. By those who reported some disease as attended by a high mortality in 1882, the following diseases were reported, each by the number stated:—

Diphtheria, by 5; old age and typhoid fever, each by 3; consumption, by 2; accident, apoplexy, bronchitis, lung diseases, heart diseases, measles, scarlet fever, and whooping-cough, each by one.

A tabular view of the replies to this question is shown in Exhibit 3, pages 8 and 9.

EXHIBIT 1.—*Eleven Geographical Divisions of the State, formed for the purpose of facilitating the Study of Causes of Sickness and of Deaths; with a List of Counties included in each Division.*

Upper Peninsular.	North- western.	North- Central.	North- eastern.	Western.	Northern Central.	Bay and Eastern.	Central.	South- western.	Southern Central.	South- eastern.
Baraga.	Benzie.	Antrim.	Alcona.	Kent.	Clare.	Arenac.	Barry.	Allegan.	Branch.	Macomb.
Chippewa.	Gr. Traverse.	Charlevoix.	Alpena.	Lake.	Gladwin.	Bay.	Clinton.	Berrien.	Calhoun.	Monroe.
Delta.	Leelanaw.	Cheboygan.	Iosco.	Mason.	Isabella.	Huron.	Eaton.	Cass.	Hillsdale.	Oakland.
Houghton.	Manistee.	Orawford.	Montmorency.	Muskegon.	Macosta.	Lapeer.	Genesee.	Van Buren.	Jackson.	Wayne.
Isle Royal.	Manitou.	Emmet.	Ogemaw.	Newaygo.	Midland.	Saginaw.	Gratiot.		Kalamazoo.	
Keweenaw.	Missaukee.	Kalkaska.	Oscoda.	Oceana.	Roscommon.	Sanilac.	Ingham.		Lenawee.	
Mackinac.	Wexford.	Otsego.	Presque Isle.	Osceola.		St. Clair.	Ionia.		St. Joseph.	
Marquette.				Ottawa.		Tuscola.	Livingston.		Washtenaw.	
Menominee.							Montcalm.			
Ontonagon.							Shiawassee.			
Schoolcraft.										

The replies by correspondents are grouped by geographical divisions of the State, shown in this exhibit, and alphabetically by localities within the divisions. This exhibit is printed here in order to aid in turning to replies from particular localities, without referring to the index, and that reference may readily be made to it by page, from the exhibits which follow.

11. *If you can assign any cause for the unusual mortality from any disease, please do so.*

A tabular statement of the 8 replies received to this question is shown in Exhibit 3, pages 8 and 9.

12. *From what diseases or causes was there less than the usual mortality?*

Nineteen correspondents replied to this question, three of whom stated that from no disease was there less than the usual mortality. The diseases reported from which there was a less mortality are as follows:—

Malarial diseases, by 5; diphtheria and fevers, each by 2; all acute diseases, bowel diseases, cholera infantum, consumption, diseases peculiar to summer and autumn, epidemics of all kinds, inflammatory diseases, measles, mortality among infants, old age, scarlet fever, typhoid fever, and whooping-cough, each by one.

A tabular abstract of the replies to this question is shown in Exhibit 3, pages 8 and 9.

EXHIBIT 2.—*Indicating by Geographical Divisions of the State and by Localities, the Diseases of Increased and of Lessened Prevalence in Michigan during the year 1882, and the Supposed Causes of Increased and of Lessened Prevalence,—as Compiled from the Replies by 27 Correspondents to Questions 6, 7, 8, and 9, of Circular 59 from the State Board of Health.*

Divisions* and Localities	Diseases of Increased Prevalence.	Supposed Causes of Increased Prevalence.	Diseases of Lessened Prevalence.	Supposed Causes of Lessened Prevalence.
All Localities.	See Summary of Replies to Question 6, page 4.		See Summary of Replies to Question 8, page 4.	
UPPER-PENINSULAR DIV.*				
Central Mine.....	None, except it was diphtheria from which we had 2 deaths in 1881, also 2 deaths in 1882.	Diphtheria was prevalent for the first time in this county, but I can assign no cause for it.	Epidemics, scarlet fever, measles.	Want of material. Most of the children have had measles and scarlet fever. Diphtheria was isolated, disinfected, and did not spread.
Delaware Mine.....	Measles, bronchitis as sequelæ of measles, whooping-cough, typhoid fever.	Water, and overcrowding of recent immigrants.	Fewer accidental deaths.	Immunity by previous epidemics.
Fayette.....	Typhoid fever, scarlet fever, diarrhæa.	The unusual rain-fall, and the use of swamp-water for drinking purposes.	Whooping-cough and measles.	To rather cool summer. No long continued drought or heated term.
WESTERN DIVISION.*			Typho malarial fever.	To meteorological conditions.
Grandville.....			Intermittent fevers, all malarious (so-called) diseases, and generally, the congestive diseases.	
Hereby.....	None	Did not exist.	Pneumonia.	
BAY AND EASTERN DIV.*			Fever of all kinds, inflammatory diseases in general.	The absence of all epidemics and malaria and better sanitation due in a measure, doubtless, to the influence of the sanitary convention held in this place last April.
Brockway Center.....	Scarlet fever and diphtheria.		Diphtheria.	Lack of epidemic causes.
CENTRAL DIVISION.*	None	Epidemic and atmospheric causes.	Scarlet fever and measles.	
Greenville.....		Our first cases of diphtheria in 1881 were traceable to two separate and distinct cases of importation.	Cannot name any.	
Lyons.....	None		Malarial fevers.	
Otisville.....	Diphtheria.		Measles, intermittent, bilious, and typho malarial fevers, and diphtheria.	The cooler temperature of the summer and fall.
St. Johns.....	Diphtheria.			Less malarial diseases on account of swamps and wet places being kept full of water instead of drying down during the hot months.
Vermontville.....	None			
Wood's Corners.....				

Woodland. SOUTH-WESTERN DIV.* Niles Oshtemo Pottawatomie	None.....	.....	Malaria.....	Better drainage. Atmospheric causes.
St. Joseph.....	Lung diseases..... Diphtheria..... None.....	The unusual dampness of the winter and spring. Universal vaccination caused the vaccine disease.	None. Scarlet fever, diphtheria, measles. Pneumonia, intermittent and remittent fever, diarrhoea, dysentery.	Diseases not prevailing in this locality. The humidity of the air was unfavorable to the development of pneumonia. The cool summer was unfavorable to the development of miasmatic and infantile diseases. No excessively hot term following a season of wet weather.
SOUTH-CENTRAL DIV.* Hillsdale.....	Diseases of the heart. Influenza, catarrhal diseases, rheumatism, scarlet fever.	No unusual prevalence. Atmospheric conditions.	Malarial diseases. Fever, bowel diseases, especially among children. Fever, bowel troubles, and pneumonia. In fact, all acute diseases.	To the cool summer and steady winter weather.
Mendon.....	Few congestive attacks during latter part of winter and early spring.	Supposed to be the immediate effect of drawing off the pond situated on the west side of the village.....	Malaria.....	The ultimate effect of drawing off mill-pond and general drainage of marshes.
Union City, R. P. B..... Union City, E. H. H.....	None. Old age, apoplexy, and consumption.	.....	Typhoid fever, pneumonia. Malarial diseases are steadily diminishing in this vicinity.	Better hygiene, better drainage, less breaking up of new land, better care of individuals.
Ypsilanti..... SOUTH-EASTERN DIV.* Detroit.....	Typhoid fever..... Diphtheria.....	.....	Consumption.....	Dry atmosphere.
Northville..... Wyandotte.....	None. Scarlet fever.....	.....	Cholera infantum; cholera morbus. Typho malarial fever. Typhoid fever less than for several years.	Cool season. More water in wells.

*For counties included in each division, see Exhibit 1, page 5.

13. To what do you attribute the lessened mortality?

A tabular abstract of the 13 replies received to this question is shown in Exhibit 3, pages 8-9.

14. Please give names, and mention dates of the occurrence in 1882, of any and all diseases attended with an unusually high rate of mortality.

Seventeen replies were received to this question, of which 12 said there were none. Diphtheria was reported in May, July, September, and November by one; in October by two; scarlet fever in October by one; typhoid fever in autumn and winter by one; and one stated that old age, apoplexy and consumption were scattered throughout the whole year about evenly.

15. Please give names, and mention dates of the occurrence in 1882, of any and all diseases attended with an unusually low rate of mortality.

Fourteen correspondents replied to this question, of whom seven said that no disease was attended with an unusually low rate of mortality; malarial fevers, scarlet fever, and diphtheria were reported by one but no time given; dysentery was reported by one and no time given; small-pox was reported by one in February; diarrhoea, by one in July, August, September, and October; one reported fevers in spring and fall, inflammatory diseases, especially bowel diseases of children, in summer; one reported malarial diseases, and one, summer complaints and fevers, stating no time of occurrence.

[Continued on page 8.]

STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1883.

EXHIBIT 3.—*Indicating, by Localities in Michigan, the Diseases from which there was Increased Mortality, the Diseases from which there was Lessened Mortality, during the year 1882, and the Supposed Causes of Increased and of Lessened Mortality,—as compiled from the Replies by 25 Correspondents to questions 10, 11, 12, and 13, in Circular 53, from the State Board of Health.*

Divisions* and Localities.	Diseases of Increased Mortality.	Supposed Causes of Increased Mortality.	Diseases of Lessened Mortality.	Supposed Causes of Lessened Mortality.
All Localities.	See Summary of Replies to Question 10, page 4.		See Summary of Replies to Question 12, page 5.	
UPPER-PENINSULAR DIV.* Central Mich. Delaware Mich.	None. Measles, bronchitis as sequelae of measles, whooping-cough, and typhoid fever. Typhoid fever.	Water, and overcrowding of recent immigrants.	Scarlet fever.	Absence of epidemics.
Fayette.	None.	Contaminated drinking water, organic matter in uncleaned wells.	Measles, whooping cough.	Immunity by previous epidemics.
WESTERN DIVISION.* Hershey.	None.		Diphtheria.	To greater care on part of people to prevent spread, owing to great dread of diphtheria.
BAY AND EASTERN DIV.* Brookway Center.	None.	Did not exist.	Epidemics of all kinds and inflammatory diseases.	Closer attention to sanitary matters. Thorough removal of waste matters from alleys.
CENTRAL DIVISION.* Greenville.	None.	All the worst cases of diphtheria occurred from two to four days after a sudden change of weather.	Diphtheria. None.	
Lyons. Oshville.	None. Diphtheria.		Malarial diseases.	The cooler temperature of the summer and fall.
St. Johns. Vermontville.	Diphtheria. None.		Malarial and autumnal fevers.	
Wood's Corners.	None.	Severer type of diphtheria than usual, and quack doctors were trusted to doctor it more than usual.	No lessened mortality. Diseases peculiar to summer and autumn.	No epidemic of any kind. Cool weather.
SOUTH-WESTERN DIV.* Niles. Osago.	Lung diseases. Diphtheria.	No specific reason; the mortality being mostly among the very old.	Malarial.	No excessively hot term following a season of wet weather.
Pokagon. St. Joseph.	None. Old age, diphtheria, accident.			
SOUTHERN CENTRAL DIV.* Hillsdale.	Diseases of the heart.			

Typhoid fever.—Eight correspondents reported no case present. Fourteen correspondents reported a total of 138 cases, ranging from 1 to 36 cases, an average of 10 cases each.

Measles.—Sixteen correspondents reported no case present. Eight correspondents reported an aggregate of 762 cases, ranging from 3 to 500 cases, an average of 95 cases each.

Whooping-cough.—Seven correspondents reported no case present. Thirteen correspondents reported a total of 405 cases, ranging from 4 to 100 cases, an average of 31 cases each. Two reported a "few," and one reported "many."

Cerebro-spinal meningitis.—Twenty correspondents reported no case present. Three correspondents reported one case each.

Diphtheria.—Five correspondents reported no case present. Eighteen correspondents reported a total of 1,207 cases, ranging from 1 to 910 cases, an average of 67 cases each. One reported a "few" cases, and one "a considerable number."

VACCINATION IN 1882.

18. *If you know of any serious cases of illness caused by vaccination, please state the details of it, mentioning the place where the virus was procured.*

Seventeen correspondents replied to this question, of whom eleven reported that no such case of serious illness had occurred within their knowledge. One said no sickness had resulted, but there was great difficulty in making virus work. One said that vaccination was unusually adopted among the population with no serious cases of illness resulting therefrom. One stated that he "used about 200 points with the best of results. A number of children were covered with thick rash during height of febrile stage, and a few were quite badly afflicted with ulceration at the seat of vaccination. Most of the points were purchased of H. Bosworth & Sons, of Milwaukee, Wisconsin." One reported two severe cases of illness, in one of which the virus used was procured from the health officer of Chicago, and in the other, from the New England Vaccine Co. One reported ulcerating sores at seat of vaccination; profuse rash in some cases, lasting 3 months; one week's sickness; virus procured from Watertown farm, Wisconsin, and from a firm in Buffalo, New York. One correspondent wrote: "Out of 180 vaccinations in August and September, 3 or 4 only were seriously ill. These had very high fever with the entire cutaneous surface as much irritated and reddened as in any case of scarlatina I ever saw. The condition of intense severity lasted only two or three days. A portion of the virus was procured from Dr. C. H. Leonard of Detroit, a portion from Dr. Griffin, of Chicago. Allow me to say for the credit of the virus, however, that with it, I procured many successful results in revaccinations, even where repeated previous revaccinations had entirely failed."

SPREAD OF COMMUNICABLE DISEASES BY SCHOOLS.

19. *Has attendance on the public schools in your neighborhood in 1882 spread any of the diseases mentioned in question 17? If so, what diseases?*

Twenty-seven correspondents replied to this question, of whom sixteen replied, no. One of those who said no, said school was dismissed 2 weeks for diphtheria. By those who said yes, measles was thought to have been spread by 4; scarlet fever by 3; whooping-cough by 4; diphtheria by 4.

20. *Have you noticed any connection between the closing of schools and a decrease of communicable diseases in your vicinity? If so, what connection?*

Twenty-six correspondents replied to this question, of which number 21 said no such connection had been noticed; 2 stated the schools did not close; one

said the "schools were not closed, but attendance much diminished, which it is believed checked the spread of scarlet fever and measles." One said "nothing except measles;" one said that "closing school lessened the spread of diphtheria, I think." One of those who said no, said "they were closed and re-opened several times within a few weeks without giving sufficient time to decide."

DISEASES AMONG ANIMALS IN 1882.

21. *During the year 1882, what diseases occurred, at what time, and to what extent among animals? The term epizooty has been much used in this State relative to diseases among animals; as it does not designate a definite or distinct disease, please describe the character of any disease which may have occurred. Replies concerning the prevalence, character, and communicability of "hog cholera" are especially desired.*

Twenty correspondents replied to this question, of which number 14 stated that there were no diseases among animals in 1882. Pink-eye was reported by three; one said there was some sickness and mortality among hens in fall; one reported bowel troubles among horses, and a few cases of hog cholera; one of those who reported pink-eye also reported that horses were frequently sick with one or another form of epizooty.

22. *Within your observation did the "hog cholera" or a similar disease occur among other animals as mice, rats, cats, dogs, hens, colts, etc., and man?*

Twenty-one correspondents replied to this question, eighteen replying no. One said "in hens only;" one said "no, unless the disease among hens was it;" one said it occurred among hens quite extensively during summer and fall.

23. *If you know of any injurious effect caused by eating the flesh, lard, or other product of hogs diseased with "hog cholera" please state the facts.*

Sixteen correspondents replied that they knew no case of such injury.

24. *If you know of any case of communication of hog cholera to man, by inoculation or otherwise, please state the facts.*

Of sixteen correspondents who replied to this question, but one reported a case of communication of disease. His reply was, "A boy six years old died from something like diphtheria, who had played with a pet hog that died of cholera."

DISEASES IN FRUITS, CEREALS, GRASSES, POTATOES, AND OTHER CROPS.

25. *During the year 1882, what diseases, as rot, rust, smut, bunt, mildew, or mould, occurred among the crops, as potatoes, hops, fruits, and especially cereals and grasses?*

Twenty-one correspondents replied to this question. Eleven replied that no such diseases occurred. Three reported smut in corn; one saying "rather more;" one saying "corn as smutty as usual;" one reported rot in potatoes; rot in apples was reported by 3, one saying they rotted early, and one that they rotted quickly; one reported that apples mildewed; rust was reported on wheat by two; wheat was reported grown by one; one said "wheat and oats were terribly damaged by the rains just after they were cut." One said there were no diseases, but the usual amount of wet weather during harvest time. One reported hay more mouldy and mildewed than usual. One reported some hay was mouldy. One said "some mildew, perhaps 10 per cent," but did not say what was affected by it.

26. *As regards rye, oats, corn, buckwheat, and other grains raised in 1882, wheat in particular, what was the actual condition when ready for market or use?*

Twenty-four correspondents replied to this question. Seventeen replied concerning wheat; one said wheat was injured one-half by dampness and growing; one said it was not as good as usual owing to influence of rains during harvest; one said much of it was sprouted; one said wheat sprouted, other grains

secured in excellent condition, and in good quality; one said wheat was very wet when harvested, and much of it was wet and grown when threshed; one said wheat mostly grown, other grains sound; one said it was very much grown; one said wheat was poor, but other grains were harvested in good condition; one said "wheat terrible poor, and oats good mostly;" one said wheat was bad from rains; one said wheat on clay grounds was grown, buckwheat very nice; one said wheat grown in places badly, some of it damp when secured; one said wheat in some instances was damaged by wet weather, one said grains were in good condition with the exception of wheat and oats, which were badly damaged by rains; one said a great deal of wheat was sprouted and some shrunk from rust; one said wheat badly grown and damp; one said wheat was much of it in poor condition; one reported crops good; two, good generally; one said, A No. 1; one said his was not a grain-growing country. One said of the crops, greater part in good condition. One said, corn quite soft and unripe.

27. *Were any of these grains, mentioned in question 27, affected by any kind of fungus?*

Twenty-one replies were received to this question, of which number 17 replied no; one said, some smut on corn; one said, more in corn and oats than usual; one said, more smut on corn; one said, "corn with smut."

28. *Was the wheat raised in 1882, generally allowed to get thoroughly dry before it was threshed?*

Twenty-five replied to this question, 12 saying no, and seven saying yes; one said, the greater part; one, some damaged; one, much of it; one, part of it; one, fairly so; and one said, none raised.

29. *Did a greater, a less, or the usual proportion of wheat raised in 1882 "bank" in the bin?*

Fifteen correspondents replied, 11 saying greater, 2 saying less; one, heard no complaint; one said usual.

30. *Was the hay crop secured in 1882, more or less than usually affected by mildew or mould?*

Seventeen correspondents replied, 5 saying more, 7, less; one, perhaps less; one said, generally good; one said, hay crop good; one said, clover mouldy; one said, hay good.

SOIL MOISTURE IN 1882.

31. *Please state the facts concerning the soil moisture in your locality, during each of the months in the year 1882, without reference to previous years, but comparing the months in 1882 with each other. Group them in order—driest first.*

32. *Compared with previous years, in what months of the year 1882 was the soil in your locality unusually dry?*

33. *Compared with previous years, in what months of the year 1882 was the soil in your locality unusually moist?*

Twenty-five replied to at least one of these three questions. An abstract of the replies and a summary to these questions is in Exhibit 4, on page 13.

GROUND WATER IN 1882.

34. *Please state the average depth of water in wells in your locality, in each month of the year 1882.*

35. *In your locality what is the usual average depth of earth above the ground water, as indicated by distance from the general surface of the ground down to water in wells, streams, etc.? If different parts of your locality vary greatly, please answer for such different parts.*

36. *Without reference to previous years, please state the facts concerning the depth of earth above the ground water nearest the surface, in your locality, during each month of the year 1882, as indicated by the distance down to water in wells, streams, etc., or by other facts. How many feet and inches do you estimate it, in each month?*

37. *Compared with previous years, in what months of the year 1882 was the ground water in your locality unusually high?*

38. *Compared with previous years, in what months of the year 1882 was the ground water in your locality unusually low?*

Twenty-five correspondents replied to at least one of the above 5 questions. An abstract of the replies and a summary are shown in Exhibit 5, on pages 14-15.

EXHIBIT 4.—*Soil Moisture in Michigan by Months during the year 1882, as Indicated by the Replies of 25 Correspondents to questions 31, 32, and 33, of Circular 59, from the State Board of Health.*

Divisions* and Localities.	Soil Moisture by Months and without Reference to Previous Years. Months in Order of Dryness. Driest First.—(Question 31, page 12.)	Soil Unusually Dry, Time.—(Question 32, page 12.)	Soil Unusually Moist, Time.—(Question 33, page 12.)
All Localities.	†	‡	§
UPPER PENINSULAR DIV.*			
Central Mine.....	-----	-----	May and part of June.
Delaware Mine.....	-----	No noticeable difference.	No noticeable difference.
Fayette.....	Spring wet; and month of July....	Was not unusually dry.	July and Spring.
WESTERN DIVISION.*			
Grandville.....	-----	October.....	June.
Hersey.....	Aug., Sept., Mar., Apr., Oct., May, June, and July.	In no month was it unusually dry as it has been in past years.	June and July.
BAY AND EASTERN DIV.*			
Brockway Center.....	-----	May, June, Nov., Dec.	August.
CENTRAL DIVISION.*			
Greenville.....	Aug., last of June, and first of July.	First part of July. Have no record.	Latter part of July.
Lyons.....	-----	May and June.	July and August.
Odenville.....	July, Oct., Nov., Dec., Sept., Aug., June, May, Apr., March, Feb., Jan.	July.....	March.
St. Johns.....	July was very dry, and Aug. excessively wet.	-----	August.
Vermontville.....	July, June were dry; Aug. and last week of July wet, very wet; Sept., Oct., Nov., Dec., dry; perhaps not in order named.	July.....	August.
Wood's Corners.....	Oct. the driest month; but unusually moist throughout the year.	Unusually moist during the year. Sept. and Oct.	The whole year.
Woodland.....	-----	-----	July and August.
SOUTH-WESTERN DIV.*			
Niles.....	-----	Think no month was unusually dry.	-----
Otsego.....	June and July unusually wet.	None.....	May, June, July.
Pokagon.....	Aug. Sept.	-----	-----
St. Joseph.....	-----	December.....	April and May.
SOUTHERN CENTRAL DIV.*			
Hillsdale.....	Dec. Aug., July, Sept., Nov., Feb., Jan., Oct., June, May, April, Mar.	December.....	March, Apr., May, June.
Jerome.....	First part of Spring and Summer quite dry; last part of Summer and Fall wet.	Apr., May, June, for part of July.	Last of July, Aug., Sept.
Mendon.....	Dec., Nov., Oct., Sept., Aug., July, June, April, May, Feb., Jan., Mar.	Dec., Nov., Oct.	Mar., Jan., Feb.
Union City, R. P. B..	Dec., Nov., Oct., Sept., Feb., May, Jan., Apr., Mar., Aug., June, July.	Dec., Nov.....	July, August.
Union City, E. H. H..	Last half of Aug., Sept., first of Oct.; other months unusually wet.	None.....	Nearly or quite all.
Ypsilanti.....	Oct., Aug.....	It was not discernible.	-----
SOUTH-EASTERN DIV.*			
Northville.....	Last of July and Aug., especially wet.	None.....	August.
Wyandotte.....	-----	At no time as compared with previous years.	Wells did not become dry during season, contrary to what is usual in summer and fall.

*For counties included in each division see exhibit 1, page 5.

†These statements cannot well be summarized. Most of them name the months in order of dryness of soil, driest first. Sixteen correspondents made replies to question 31.

‡Soil reported *unusually dry* at some time of the year 1882, by 12 correspondents, as follows:—In April, by 1; in May, by 3; in June, by 3; in July, by 4; in Sept., by 1; in Oct., by 3; in Nov., by 3; in Dec., by 5; At no time, by 9; one said, no noticeable difference.

§Soil reported *unusually moist* at some time of the year 1882, by 13 correspondents, as follows:—In Jan., by 1; in Feb., by 1; in Mar., by 3; in Apr., by 2; in May, by 4; in June, by 5; in July, by 8; in Aug., by 2; in Sept., by 1. One said the whole year; one, nearly or quite all; one, that wells did not become dry as usual in summer and fall.

EXHIBIT 5.—Depth of Water in Wells, Depth of Earth above Ground Water, and Relative Height of Ground Water, in Michigan, by Months, during the Year 1882,—as Indicated by the Replies of 25 Correspondents to Questions 34, 35, 36, 37, and 38, of Circular 58, from the State Board of Health.

Divisions* and Localities.	Average Depth of Water in Wells, by Months.—(Question 34, page 12.)	Usual Depth of Earth Above Ground Water.—(Question 35, page 12.)	Depth of Earth Above Ground Water, by Months.—(Question 36, page 12.)	Ground Water Unusually High. Time.—(Question 37, page 12.)	Ground Water Unusually Low. Time.—(Question 38, page 12.)
All Localities.	†	‡	§	||	π
UPPER PENINSULAR DIV.*					
Central Mine.....	No variation from previous reports. Mostly failing springs.	Average about 10 feet. Wells are of slight depth, say 1 to 3 feet to bed rock.	See answer to 35.	See answer to 35.	See answer to 35.
Fayette.....	Mostly drilled wells.	13 or 20 feet.			No lower than usual.
WESTERN DIVISION.*					
Grandville.....	Does not vary.	In W. and N. part of town, about 20 ft.; in S. part from 25 to 70 feet.	No clay subsoil here.		December.
Horsely.....	Jan., Feb., Mar., 10 ft.; Apr., 9 ft., May, 8 ft.; June and July, 6 ft.; Aug. and Sept., 1½ ft.; Oct., 9 ft.; Nov., 7 ft.; Dec., 4 ft.	10 feet.	Jan., Feb., Mar., Apr., 4 ft.; May, 6 ft.; June, 10 ft.; July, 14 ft.; Aug., Sept., 10 ft.; Oct., 14 ft.; Nov., 15 ft.; Dec., 18 ft.		About the same level at all times.
BAY AND EASTERN DIV.*					
Brockway Center.....	The depth of water in wells about 3 or 3½ feet, and not visibly affected by amount of rain.	About 35 ft. on an average. Less toward Flat river; more in upper parts of the town.	Not much variation at different seasons of the year.		May and June. July, Oct., and Dec.
CENTRAL DIVISION.*					
Greenville.....	Jan., 6 ft.; Feb., 5½ ft.; Mar., 7½ ft.; Apr., 5½ ft.; May, 6 ft.; June, 4 ft.; July, 2½ ft.; Aug., 3 ft.; Sept., 3½ ft.; Oct., 2½ ft.; Nov., 3 ft.; Dec., 3½ ft.	Varies from 1 to 25 feet.	Jan., 8 ft.; Feb., 7½ ft.; Mar., 7 ft.; Apr. and May, 8½ ft.; June, 9½ ft.; July, 12 ft.; Aug., 11 ft.; Sept., 10 ft.; Oct., 12 ft.; Nov., 10 ft.; Dec., 11 ft.	July. March.	Little variation in any year.
Lyons.....	As our well-waters are mostly drawn from one general reservoir in quicksand, there is no great variation.	6 to 35 feet, according to undulations of surface.	See answers to 34 and 35.		December. In not any.
Otisville.....					
St. Johns.....					
Vermontville.....					
Wood's Corners.....					

Woodland.....	Jan., 2½ ft.; Feb., Mar., Apr., May, June, 2 ft.; July, 1½ ft.; Aug., 2 ft.; Sept., Oct., Nov., 1½ ft.; Dec., 2 ft.	In wells, 30; in streams, 2 ft. to 3 ft.	Jan., Feb., Mar., Apr., May, June, 15 ft.; July, 16 ft.; Aug., 17 ft.; Sept., 18 ft.; Oct., Nov., 14 ft.; Dec., 13 ft.	July and August.	December.
SOUTH-WESTERN DIV.*					
Niles.....	.....	.....	.....	June and July. •	None.
Osago.....	.....	Varies greatly; from 6 to 100 ft.	.....	Not unusually high.	Not unusually low.
Pokagon.....	.....	15 to 20 ft. in the valleys, and 20 to 40 feet on up-land.	.....	.....	.....
SOUTHERN CENTRAL DIV.*					
Hillsdale.....	.....	30 to 60 feet.	.....	Mar., Apr., May, June.	December.
Hudson.....	.....	10 feet.	.....	Not unusually high.	In the Fall.
Jerome.....	.....	About 22 ft. in the village. All wells are now (Jan., 1883) dry which have not been deepened.	.....	Higher than usual all the year.	.....
Mendon.....	.....	.....	.....	January and March.	.....
SOUTHERN EASTERN DIV.*					
Northville.....	Jan., Feb., Mar., Apr., May, June, and July, 30 ft.; Aug., Sept., 23 ft.; Oct., 26 ft.; Nov., Dec., 30 ft.	Forty ft.; along river flat 6 to 18 ft. About 35 ft. on N. side, and from 20 to 25 ft. on S. side of river. 30 ft. on W. side, and 35 to 40 ft. on E. side of Huron river.	.....	July and August.	Dec., Nov.
Wyandotte.....	.....	From 25 to 50 ft., except the springs, which are numerous.	Do not think it varied much during the year.	.....	October.
	.....	From 2 to 10 feet.	.....	In the Spring.	None.

* For counties included in each division see Exhibit 1, page 5.

† In reply to question 34, 9 correspondents made statements (not all of them, however, by months) concerning the average depth of wells in 1882. A tabular abstract of the statements is shown in the second column of the above exhibit.

‡ In reply to question 35, 21 correspondents made statements concerning the usual average depth of earth above ground water in 1882.

§ In reply to question 36, 3 correspondents made statements concerning the depth of earth above ground water by months in 1882.

|| Ground water reported *unusually high* at some time of the year 1882, by 12 correspondents, as follows:—In Jan., by 1; in March, by 3; in Apr., by 1; in May, by 1; in June, by 2; in July, by 4; in Aug., by 1; in the Spring, by 1; higher than usual all the year, by 1; not unusually high, by 2; in every month, by 1; little variation in any year, by 1; one, said about the same level at all times.

¶ Ground water reported *unusually low* at some time of the year 1882, by 10 correspondents, as follows:—In May, by 1; in June, by 1; in July, by 1; in Sept., by 1; in Oct., by 3; in Nov., by 2; in Dec., by 7; at no time, by 5; in the Fall, by 1; little variation in any year, by 1; about the same level at all times, by 1.

39. *Please communicate facts bearing upon, or cases illustrating the causation or communicability of diseases.*

But 3 correspondents replied to this question. One stated that a physician attending a case of diphtheria contracted the disease and communicated it to his brother, from which he died. One stated that diphtheria of malignant form was brought from Detroit on clothing. One reported typhoid fever from swamp water.

40. *If scarlet fever occurred in your locality in the year 1882, please state the facts concerning the means by which it was introduced and communicated.*

This question was replied to by 17 correspondents. One said: "Four cases were brought here (Ypsilanti) by students to the Normal school. The others originated here, and had no apparent cause of origin, and occurred at *different times* and in far separated localities." One reported 3 cases, two having been contracted from exposure outside the city; the source of the third was unknown. One reported as follows: "One family of five had scarlet fever, commencing about three weeks after removing a coffin from a grave. The child had died six years previously from scarlet fever. The first one that had the disease was a young man about 25 years old, who assisted in removing the coffin." One reported: "How first it came in town I do not know, but it was introduced into the schools, from whence it spread; also by neighborly visitation upon the sick." One reported five isolated cases which could not be traced to a communicable cause. One reported: "Brought from a distance of ten miles through a family visiting another who had scarlet fever." One reported "very few cases." One reported that the disease was caused "by contagium from the epidemic at Manistique; further communicated by intercourse at Lock Bay." One reported the disease imported from Coldwater to Otsego. One did not know the manner of introduction, but stated that it was spread by careless visiting. One stated: "Originated in a family in the country five miles from town; gradually and chiefly spread by the medium of schools."

41. *If diphtheria occurred in your locality in the year 1882, please state the facts concerning the means by which it was introduced and communicated.*

This question was replied to by 25 correspondents. One reported: "Two cases were brought here from Detroit. Two originated here (at least were reported as diphtheria) in August. The other cases, though reported to the Board of Health as diphtheria, were very doubtful, both as to origin and correctness of diagnosis. If membranous croup and diphtheria are identical, as asserted by some authors, we have had more cases than are reported above. I most emphatically deny the correctness of this theory." One said: "It has been asserted to have occurred, but I have not seen any case which terminated fatally, and all that I have seen appeared to be an inflammation of the tonsils with a membranous deposit yielding to treatment promptly, with none of the sequelæ of diphtheria, not one case coming to the average severity of the epidemic of 1880 in Kent county." One reported four cases in one family; the origin "believed to be exposure of children to cold and damp during spring months." One reported two cases, but could not state the means by which it was communicated. One said "by visiting." One reported sporadic diphtheria in three families, which were isolated, and no other families were exposed. One stated that it was spread by schools, and by visiting sick persons. One reported "one case only, in June. A young girl who stated that she had been to a place a few days previous where the children had 'sore throat.'" One reported: "Diphtheria occurred here in 1882, but not so frequently as in 1881. During

the latter year it prevailed to an alarming extent among the families of farmers in this vicinity. In one instance four children of one family were buried in a common grave. In most cases the disease appeared to spread from one member of a household to the rest, but in a few instances it seemed to have been conveyed into a household by some one visiting an infected family." One said: "There has been a large number of cases of diphtheria here the last year; some could be easily traced to other cases, showing contagion to be the prime factor. Others occurred where no previous exposure could be determined, showing epidemic causes to be the principal factors." One reported that the cases were sporadic, and there was nothing to show contagion. One stated that malignant diphtheria was introduced in clothing. One said it was "introduced from Alamo, Kalamazoo county, by relatives. Spread in school by a scholar taken sick in school. All cases can be traced to this one that occurred in this part of the town." One said: "Do not know how it was introduced; communicated by careless contact, visiting from family to family, etc." One said: "In two or three families it seemed to break out about the same time without any apparent cause. In a few cases decomposing organic matter seemed to furnish the disease." One wrote: "Have had no epidemic in the city. In the country, about five miles from town, the disease was contracted from a laborer who came from a distance, and was suffering from what was supposed to be ordinary sore throat. It was spread by direct contagion to six families in the immediate neighborhood, as many as eighteen persons being affected, with three deaths. A case showing the tenacity of the disease in clinging to dwellings is as follows: A little girl living in the city was attacked with a severe form of diphtheria in July, 1882, recovering pretty fully in August. The house was fumigated with burning sulphur after her recovery. Another family moved into the same house in December following. Within a week after occupation a little girl of ten years was attacked with diphtheria in a well-known form." Afterwards the correspondent wrote that the privy was not disinfected, and this might be the medium of the spread of the disease. One correspondent reported the first case of diphtheria to have been in "a young girl from the village who was working in the east part of the town, where a child was taken with diphtheria, and a few days after that the girl from this place was taken down and brought home here. The whole family of seven had it; three of them died. From there it seemed to spread, as there was no precaution taken to prevent it. In the first start it was claimed by the attending physician that it was not contagious." One reported that diphtheria "was imported here in August, 1881, and 'summered and wintered over' in large quantities. No systematic efforts were made to circumscribe or eradicate the difficulty. No family was put in quarantine. Restrictions were only nominal—not at all thorough. Over fifty of our children died from diphtheria in less than one year from August, 1881." One reported: "A daughter of a citizen of Bushnell contracted the disease at Stanton in the last month of 1881, and came home to her father's house. The disease was not recognized, and no restraint placed over the case, and neighbors visited the house. The girl died, and a public funeral was held at the house while another member of the family was sick with the disease. From this case the disease spread extensively through Bushnell, Bloomer, and North Plains, and to some extent in Ronald, being carried in at least one instance several miles. Continued to prevail to some extent into the summer of 1882." One replied "unknown." Four stated that the disease did not prevail. One reported: "Originated in a family in

the country, five miles from town; gradually and chiefly spread by the medium of schools."

42. *Suggestions concerning methods which seem practicable, for the prevention of sickness or deaths, in your locality, or in this State, will be gladly received. (They may be written on another sheet.)*

DR. R. P. BEEBE, of Union City, wrote as follows;—"I think if better ventilation could be had in our houses and school-buildings, it would prevent some chronic diseases, as tubercular and scrofulous. Diphtheria could be prevented if vegetable matter was not allowed to decay around houses so as to contaminate water and air. I am quite positive on the last, from a few cases of observation."

DR. E. HALSEY WOOD, of Hersey, wrote as follows:—"I merely desire to suggest that the State Board of Health would make inquiry on one point to wit: As to what extent milk is used as an article of diet at each meal in those families infected with diphtheria. My idea is that diphtheria follows upon the non-use of milk by children as an article of every day consumption. The observations I have made in every case support this idea."

DR. J. A. BAUGHMAN, of Woodland, suggested "better drainage."

DR. C. A. WISNER, of Otisville, said:—"There are several swamps and ponds in this locality which, if drained, would add materially to the health of the people."

DR. J. M. SWIFT, of Northville, wrote:—"A law carried into execution with heavy penalty for leaving infected localities until a permit from competent authority is granted."

DR. JUDSON BRADLEY, of Detroit, wrote:—"Isolation seems to prevent spread of scarlet fever and diphtheria, if it can be done faithfully and honestly; but there seems to be the trouble. People will not do it. It is more important to have a 'wake' than to prevent the spread of disease."

DR. G. E. CORBIN, of St. Johns, wrote:—"Deep, large privy-vaults in our clay soil receive the total (with very few exceptions) human excrements of this village. Many vaults contain the accumulations of years. As we have no system of water-works, or natural streams to aid in cleansing our town, dry earth closets should be substituted for these foul privy-vaults. Such an arrangement would be a source of protection to our well-water."

As stated after question 17, in the absence of positive knowledge, opinions are desired. The fact that it will be difficult, and sometimes impossible, to give the information asked for is well understood; the importance of the subject, however, warrants the request that each correspondent will take the care necessary to give definite replies to all questions. The great value of a compilation of such replies must be conceded. Inasmuch as a similar circular will probably be issued for 1883, it would facilitate replying to that circular and add to the value of the replies, if correspondents would, during the year, make a record of facts concerning the prevalence of diseases, concerning meteorological conditions, and concerning soil moisture and ground water observed during the year. It is believed that in this way may be accumulated data which eventually will be of great value to the people.

By direction of the State Board of Health.

Very Respectfully,

HENRY B. BAKER, *Secretary.*

For convenience of study and reference, the replies to the circular have been grouped by geographical divisions of the State, which divisions are shown in Exhibit 1, page 5. It should be remembered that the Board assumes no responsibility for opinions or theories expressed by those who reply to its circulars, but its correspondents have been selected with great care, and include many of the leading physicians in the State.

Respectfully submitted,

HENRY B. BAKER, *Secretary.*

The replies to Circular 59 are as follows:—

UPPER-PENINSULAR DIVISION OF THE STATE.*

REPLIES BY GEO. W. ORR, M. D., OF CENTRAL MINE, MICHIGAN.

1. † Mining location, 1,200 to 1,300.
2. Thirteen; actual number.
3. Central Mining Location, including the township of Sherman, Keweenaw Co., Mich.
4. Diminished nearly one-half from 1881.
5. About the average.
6. None, except it was diphtheria, from which we had 2 deaths in 1881, also 2 deaths in 1882.
7. Diphtheria was prevalent for the first time in this county, but I can assign no cause for it.
8. Epidemics, scarlet fever, measles.
9. A want of material; most all the children have had measles and scarlet fever. Diphtheria was isolated and disinfected, and did not spread.
10. None.
11. From scarlet fever.
12. Absence of epidemics.
13. Diphtheria, scattered along from January 1 to August 1.
14. Cholera, 7; scarlet fever, 5; typhoid fever, 2; diphtheria, 16.
15. I used about 200 points with the best of results. A number of children were covered with a thick rash during height of febrile stage,

and a few were quite badly afflicted with ulceration at the seat of vaccination. Most of the points were purchased of H. Bosworth & Sons, Milwaukee, Wis.

19. No. At one time we dismissed school for two weeks on account of diphtheria.

20. I was unable to trace any cases to school.

21. We have had many hogs die with what is called hog cholera here; the only symptoms that I have noticed is disgust for food; a desire to get something solid in the mouth to bite on, with occasional spasmodic action, affecting the foreparts more than the rear; diarrhea, etc.

22. In hens only, as far as I know.

23. I do not know of its having been used.

24. I know of no such case.

25. I know of none.

26. This is not a grain-producing country.

27. May and a part of June.

28. The average was about 10 feet.

Very Respectfully,

GEO. W. ORR, M. D.

Central Mine, Keweenaw County.

REPLIES BY THOS. D. BRADFIELD, M. D., OF DELAWARE MINE, MICH.

3. † Grant township, Keweenaw Co.
4. Much greater. Increase 300 per cent.
5. Sixty per cent greater.
6. Measles, bronchitis as a sequela of measles, whooping cough and typhoid fever.
7. Water and over-crowding of recent immigrants.
8. Fewer accidental deaths.
9. See reply to No. 6.
10. See reply to No. 7.
11. None.
12. None.
13. None.
14. Measles, whooping cough, and typhoid fever were brought here by immigrants about July 1st.
15. Typhoid fever, about 15; measles, about 160; whooping cough, about 70. Had nine cases diphtheritic sore throat with fever—not genuine diphtheria.
16. None.
17. Yes. Measles.
18. No. No connection, for houses are close together and tenants often move. In the past year we had a constant stream of Scandinavian immigrants bringing contagious diseases.

21. None.

22, 23 and 24. No.

25. None.

26. No.

27. None.

28. None raised.

29 and 30. No noticeable difference.

31. No variation from previous reports. *Mostly never-falling springs.*

32, 33, 34, and 35. Houses on side hills, and wells are, as a rule, of slight depth, say 1 to 3 feet to bed rock.

36. Could not add anything to observations of the past decade.

37. Did not occur.

38. It has been asserted to have occurred, but I have not seen any case which terminated fatally and all that I have seen appeared to be an inflammation of the tonsils with a membranous deposit yielding to treatment promptly, with none of the sequelæ of diphtheria, not one case coming to the average severity of the epidemic of 1880 in Kent Co.

Very Respectfully,

THOMAS D. BRADFIELD, M. D.

Delaware Mine P. O., Keweenaw Co., Jan. 29, '83.

REPLIES BY H. W. DAVIS, M. D., OF FAYETTE, DELTA COUNTY, MICH.

1. † Not incorporated; 800.
2. Fifteen.
3. Fairbanks, Namah, and Lock Bay townships, Delta Co., Mich.
4. About the same.
5. Twenty per cent greater.
6. Typhoid fever, scarlet fever, diarrhoeas.
7. Due to the unusual rain-fall and the use of swamp-water for drinking purposes.
8. Whooping-cough and measles.
9. Immunity by previous epidemics.
10. Typhoid fever.
11. Contaminated drinking water; organic matter in uncleaned wells.
12. Measles and whooping-cough.
13. See question 9.
14. Scarlet fever in October; typhoid fever in Autumn and Winter months.
15. Diarrhoea in July, Aug., Sept., and Oct.
16. Typhoid fever.
17. Scarlet fever, 6; typhoid fever, 12; whooping-cough, 4.

19 and 20. No.

21 and 22. None.

23. A No. 1.

24. No.

25. Yes.

26. The usual proportion.

27. No.

28. Spring wet, and month of July.

29. Was not unusually dry.

30. July and Spring.

31. Mostly drilled wells.

32. 18 or 20 feet.

33. Typhoid fever in one locality, from swamp-water.

34. By contagium from an epidemic at Manistique; further communicated by intercourse at Lock Bay.

35. Did not occur.

Very Respectfully,

H. W. DAVIS, M. D.

Fayette, Delta Co., Jan. 20, 1883.

* For counties included in each division, see Exhibit 1, page 5.

† The figures beginning paragraphs refer to questions in Circular 59, printed (in small type) on pages 1-18 of this Report. A summary of the Replies is printed on the same pages.

WESTERN DIVISION OF THE STATE.*

REPLIES BY A. H. WESTON, M. D., OF GRANDVILLE, KENT CO., MICH.

1. † I live in a small village not incorporated.
2. For the township of Wyoming, Kent Co.
4. Rather less.
5. 20 per cent less I should judge. I have no records to base a reply.
8. Typhoid malarial fever.
9. To rather cool summer; no long continued drouth or heated term.
14. None within my knowledge.
- 19 and 23. No.
21. Have heard of no diseases among animals more than common.
22. No.
25. Some wheat was hurt by rust.
26. A great deal of wheat was sprouted, and some shrunk from rust.
27. Not to my knowledge.
29. Yes.
30. I heard no complaint.

30. Hay was in good condition.
32. October.
33. June.

35. In the west and north part of town about 20 feet; in the south part from 25 to 70 feet.
38. No lower than usual.

41. The first case was a young girl from this village who was working in the east part of the town when a child was taken with diphtheria; a few days after that the girl from this place was taken down and brought home here. The whole family of 7 had it; three of them died and from there it seemed to spread, as there were no precautions taken to prevent it in the first start. It was claimed by the attending physician that it was not contagious.

Very Respectfully,

A. H. WESTON, M. D.

Grandville, Kent Co., April 26, 1883.

D., OF HERSEY, OSCEOLA CO., MICH.

1. † Village; population 600.
2. 6.
3. The half of two adjoining townships—Richmond and Hersey, in the county of Osceola, Michigan.
4. At least one-half less.
5. 50 per cent less than 1881.
6. None.
8. Intermittent fever; all malarious (so-called) diseases and generally the congestive diseases.
9. To meteorological conditions.
10. None.
12. Diphtheria.
13. To greater care on part of people to prevent spread owing to great dread of diphtheria.
- 14, 15, and 16. None.
17. Diphtheria, 15.
18. Do not.
- 19 and 20. No.
21. No hog cholera. Pink eye in horses prevailed during December.
22. No.
- 23 and 24. Do not.
25. None.
26. Wheat mostly grown, other grains sound.
- 27 and 28. No.
29. Greater.
30. Less.
31. August, September, and March—April, October—May, June, and July.

32. In no month was it unusually dry as it has been in past years.
33. June and July.
34. Water in wells does not vary in any month.
35. From 10 to 22 feet.
36. No clay subsoil here.

39. A physician attending a case of diphtheria contracted the disease and communicated it to his brother from which the latter died.

41. Diphtheria occurred here in 1882, but not so frequently as in 1881. During the latter year it prevailed to an alarming extent among the families of farmers in this vicinity. In one instance four children of one family were buried in a common grave. In most cases the disease appeared to spread from one member of a household to the rest, but in a few instances it seemed to have been conveyed into a household by some one visiting an infected family.

42. I merely desire to suggest that the Board of Health would make inquiry on one point to wit: As to what extent milk is used as an article of diet at each meal in those families infected with diphtheria. My idea is that diphtheria follows upon the non-use of milk by children as an article of every day consumption. The observations I have made in every case support this idea.

Very Respectfully, E. HALSEY WOOD, M. D.

Hersey, Osceola Co., Jan. 6, 1883.

BAY AND EASTERN DIVISION OF THE STATE.*

REPLIES BY A. MITCHELL, M. D., OF BROCKWAY CENTER, MICH.

1. † Not incorporated.
2. Brockway, Lynn, Spencer and a part of Maple Valley, Elk, Fremont, Kenosha, Green-wood.
4. About 25 per cent loss.
5. 34 less.
6. Scarlet fever and diphtheria.
8. Pneumonia.
10. None.
12. Dysentery.
17. Scarlet fever, 50; typhoid fever, 10; diphtheria, 20.
- 19, 20, and 28. No.
26. Much of it was sprouted.
- 27 and 28. No.
29. Yes.
30. No.
32. May, June, November, and December.
33. August.

34. Jan., 10; Feb., 10; March, 10; April, 9; May, 8; June, 6; July, 6; Aug., 10; Sept., 10; Oct., 9; Nov., 7; Dec., 4.
35. 10 feet.

38. Jan., 4; Feb., 4; March, 4; April 4; May, 6; June, 10; July, 14; Aug., 10; Sept., 10; Oct., 14; Nov., 15; Dec., 18.
37. August.
38. December.

40. One family of 5 had scarlet fever, commencing about 3 weeks after removing a coffin from grave; child had died 6 years previously from scarlet fever. The first one that had the disease was a young man about 25 years old, who assisted in removing the coffin.

41. By visiting.

Very Respectfully,

A. MITCHELL, M. D.

Brockway Center, St. Clair Co., Jan. 1, 1883.

CENTRAL DIVISION OF THE STATE.*

REPLIES BY CHARLES S. SHELDON, A. M., M. D., OF GREENVILLE, MONTCALM CO., MICHIGAN.

1. † 3,500.
2. 35.
3. Greenville, and a radius of five miles in each direction.
4. Largely diminished; say 83 per cent.
5. It was diminished about 80 or 85 per cent.

6. None.
7. Did not exist.
8. Fevers of all kinds, and the inflammatory diseases in general.
9. The absence of all epidemics and malaria, and better sanitation, due in a measure, doubt.

* For counties included in each division, see Exhibit 1, page 5.

† The figures beginning paragraphs refer to questions in Circular 59, printed (in small type) on pages 1-18 of this Report. A summary of the Replies is printed on the same pages.

less, to the influence of the Sanitary Convention held in this place April last.

10. None.
11. Did not exist.
12. Epidemics of all kinds, fevers and inflammatory diseases.
13. To causes mentioned above, and closer attention to sanitary matters—thorough removal of waste matter from alleys, etc.
14. There were none.
15. Fevers in Spring and Fall; inflammatory diseases; especially bowel diseases of children in Summer.
16. None.
17. Scarlet fever, 6 or 7; measles, 18 or 20; whooping-cough, 20; diphtheria, 15 or 20 cases.
18. Know of none.
19. Yes, whooping-cough.
20. No.
21. There have been no diseases among animals in this locality.
- 22 and 23. No.
24. Know of none.
25. None of these occurred.
26. Grains were in good condition, with the exception of wheat and oats, which were badly damaged in this section by the rains in the latter part of July.
- 27 and 28. No.
29. Greater.
30. Less.
31. August. Last of June and first of July.

REPLIES BY D. C. SPALDING, M. D., OF LYONS, IONIA CO., MICH.

1. † 800.
3. Village of Lyons, Ionia Co.
4. † less.
6. None.
8. Diphtheria.
10. None.
12. Diphtheria.
14. Had none.
17. Typhoid fever, 1; cerebro-spinal meningitis, 1; diphtheria, 2.
- 19 and 20. No.
21. None in this vicinity.
- 22, 23, and 24. No.
25. Wheat injured one-half by dampness and growing.

REPLIES BY C. A. WISNER, M. D., OF OTISVILLE, GENESEE CO., MICH.

1. † 400. Township 1,200.
2. About twenty.
3. Village of Otisville, and township of Forest.
4. About the same as the average.
5. About the same.
6. Diphtheria.
7. Epidemic and atmospheric causes.
8. Scarlet fever and measles.
9. Lack of epidemic causes.
10. Diphtheria.
11. All of the worst cases of diphtheria occurred from two to four days after a sudden change of the weather.
12. None.
14. Diphtheria July 23, Sept. 8, Oct. 18, and Nov. 1.
- 15 and 16. None.
17. Typhoid fever, 11; whooping-cough, 5; diphtheria, 75.
18. Do not know of any. All who were vaccinated got along nicely without any sickness.
19. I do not think it has.
20. Have not.
21. No epidemic of any kind.
22. No.
- 23 and 24. Do not know of any.
25. Some rust on wheat and rather more smut on corn than usual.
26. Wheat poor; the other grains were harvested in good condition.
27. More smut on corn than usual.
28. No.

32. First part of July. Have no record.
33. Latter part of July.
34. The depth of water in wells about 3 or 3½ feet, and not visibly affected by amount of rain.
35. About 35 feet on an average; less toward Flat river; more in upper parts of the town.
36. Not much variation at different seasons of year.
- 37 and 38. The height of ground-water at about the same level at all times.
40. I know of none which would be of interest.
41. Have had no epidemics in the city. In the country, about five miles from town, the disease was contracted from a laborer who came from a distance, and was suffering from what was supposed to be ordinary sore throat. It was spread by direct contagion to six families in the immediate neighborhood, as many as eighteen persons being affected, with 3 deaths. A case showing the tenacity of the disease in clinging to dwellings is as follows: A little girl living in the city was attacked with a severe form of diphtheria in July last, recovering pretty fully in August. The house was fumigated with burning sulphur after her recovery. Another family moved into the same house in December following. Within a week after occupation a little girl of ten years was attacked with diphtheria in a well marked form.*

Very Respectfully,
CHARLES S. SHELDON.
Greenville, Montcalm Co., May 1, 1883.

27. Think not.
28. Yes.
29. Do not know.
30. More.
32. I think May and June.
33. July and August.
35. 20 feet.
37. July.
38. May and June.
41. 2 cases. Can not state the means by which it was communicated.

Very Respectfully,
D. C. SPALDING, M. D.
Lyons, Ionia Co., January, 1883.

29. More.
30. Hay crop good.
31. July, October, November, December, September, August, June, May, April, March, February, January.
32. July.
33. March.
34. Jan., 6 ft.; Feb., 6 ft. 6 in.; March, 7 ft. 1 in.; April, 5 ft. 6 in.; May, 5 ft. 4 in.; June, 4 ft. 5 in.; July, 2 ft. 3 in.; Aug., 3 ft. 10 in.; Sept., 3 ft. 6 in.; Oct., 2 ft. 10 in.; Nov., 3 ft.; Dec., 3 ft. 4 in.
35. Varies from one to twenty-five feet.
36. Jan., 8 ft.; Feb., 7 ft. 6 in.; March 7 ft.; April, 8 ft. 1 in.; May, 8 ft. 1 in.; June, 9 ft. 1 in.; July 12 ft.; Aug. 11 ft.; Sept., 10 ft.; Oct., 12 ft.; Nov. 10 ft.; Dec., 11 ft.
37. March.
38. July, October, and December.
40. No cases have occurred.
41. There has been a large number of cases of diphtheria here the last year. Some could be easily traced to other cases, showing contagion to be the prime factor. Others occurred where no previous exposure could be determined, showing epidemic causes to be the principal factors.
42. There are several swamps and ponds in this locality, which if drained would add materially to the health of the people.

Very Respectfully,
C. A. WISNER, M. D.
Otisville, Genesee Co., Jan. 22, 1883.

*Dr. Sheldon afterwards wrote that the privy was not disinfected.

†The figures beginning paragraphs refer to questions in Circular 69, printed (in small type) on pages 1-13 of this Report. A summary of the replies is printed on the same pages.

22 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1883.

REPLIES BY G. E. CORBIN, M. D., OF ST. JOHNS, CLINTON CO., MICH.

1. † 2,600.
2. 30.
3. For the incorporated village of St. Johns.
4. Doubled.
5. Nearly doubled.
6. Diphtheria.
7. Our first cases of diphtheria here in 1881 were traceable to two separate and distinct cases of importation.
8. Cannot name any.
10. Diphtheria.
16. Diphtheria.
17. Scarlet fever, a few; diphtheria, a considerable number. Cannot answer the rest.
18. Out of 180 cases vaccinated by myself in August and September, 1882, three or four only were *seriously* ill. These had very high fever, with the entire cutaneous surface as much irritated and reddened as in any case of scarlatina I ever saw. The condition of intense severity lasted only two or three days. A portion of the virus was procured from Dr. C. H. Leonard, of Detroit, and a portion from Dr. E. L. Griffin from Chicago. Allow me to say for the credit of this virus, however, that with it I procured many successful results in re-vaccinations, even where *repeated* previous vaccinations had entirely failed.
19. Probably; both diphtheria and measles.
20. No, for they were closed and re-opened several times within a few weeks, without giving sufficient time to decide the matter.
21. None that I know of.
22. Not within my knowledge.
23. None, except the usual results of "wet weather" during harvest time.
26. Wheat was very badly "grown" and damp.
28. No.
- 29 and 30. More.
31. I cannot answer as you direct. July was very dry, and August excessively wet; it rained almost every day in August.
33. August.
34. As our well-water is mostly drawn from one general reservoir in quicksand, there is no great variation.
35. Our well-water is pretty *near* on a general level in quicksand; hence it is found at a depth of 8 to 35 feet, according to undulations of the surface of the earth.
37. There is but little variation during the entire year *any* year.
38. Must answer this as I answered No. 37.
41. It was *imported* here in August, 1881, and "summered and wintered over" in large quantities. No systematic or thorough efforts were made to circumscribe or eradicate the difficulty. No family was put in quarantine. Restrictions were only nominal—not at all thorough. Over 50 of our children died from diphtheria in less than one year from August, 1881.
42. Deep, large privy-vaults in our clay soil receive the total (with very few exceptions) human excrements of this village. Many vaults contain the accumulations of years. As we have no system of water-works or natural streams to aid in cleansing our town, dry earth closets should be substituted for these foul privy vaults. Such an arrangement would be a source of protection to our well-water.

Very Respectfully,

GILBERT E. CORBIN, M. D.

St. Johns, Clinton Co., May 2, 1883.

REPLIES BY WILLIAM FARMENTER, M. D., OF VERMONTVILLE, EATON CO., MICH.

1. † 700.
2. Just 8.
3. The village of Vermontville.
4. 25 per cent less.
5. 10 per cent less.
6. None.
8. Malarial fevers.
9. The cooler temperature of the summer and fall.
10. None.
12. Malarial diseases.
13. The cooler temperature of the summer and fall.
- 14, 15, 16, 17, and 18. None.
19. No.
20. No. The answer refers to the year 1882. During 1881 an epidemic of diphtheria seemed to be controlled by closing of schools and isolation of patients.
21. None that I am aware of.
- 22, 23, and 24. No.
25. None that I am aware of.
26. Wheat damaged from sprouting. Other grains in excellent condition and of good quality.
- 27 and 28. No.
29. Greater.
31. July and June were dry; August and last week of July wet, very wet; Sept., Oct., Nov., and Dec. dry; perhaps not in order named.
32. July.
33. August.
35. 30 feet.
37. August.
38. December.
40. It has not occurred in any case that I can recall.
41. None.

Very Respectfully,

WM. FARMENTER, M. D.

Vermontville, Eaton Co., Dec. 30, 1882.

REPLIES BY GEORGE PRAY, M. D., OF WOOD'S CORNERS, IONIA CO., MICH.

3. † A part of the townships of Ronald and Orleans, Ionia Co., and Fairplains and Bushnell, Montcalm Co.
4. One-sixth less.
5. 25 per cent less.
8. Measles, intermittent, bilious, and typho-malarial fevers, and diphtheria, less than in 1881.
9. Less malarial diseases on account of swamps and wet places being kept full of water by frequent rains instead of drying down during the hot months.
- 10 and 14. None.
15. Malarial diseases for reason stated.
16. None.
17. Scarlet fever, 64; whooping-cough, estimated 30; diphtheria, estimated 30.
19. Yes, whooping-cough.
20. No.
21. No hog cholera or other prevailing disease known among animals.
22. No.
23. None here.
26. Wheat, much of it in poor condition.
27. No, not that I know of.
28. No.
30. Less.
31. October the driest month in the year, but unusually moist throughout the year, water holes being filled with water nearly through the year which had been dry before.
32. Unusually moist during whole year.
33. The whole year.
35. From 15 to 50 feet; average about 25.
36. But little variation during whole year. Surface soil driest in October, but depth of earth above water but slightly affected.

† The figures beginning paragraphs refer to questions in Circular 59, printed (in small type) on pages 1-18 of this report. A summary of the replies is printed on the same pages.

37. In every month.
38. In not any.
41. A daughter of a citizen of Bushnell contracted the disease at Stanton in the last month of 1881, and came home to her father's house. The disease was not recognized, and no restraint placed over the case and neighbors visited the house. The girl died, and a public funeral was held at the house while another member of the

family was sick with the disease. From this case the disease spread extensively through Bushnell, Bloomer, and North Plains, and to some extent in Ronald, being carried in at least one instance several miles. Continued to prevail to some extent into Summer of 1882.

Very Respectfully,
GEORGE PRAY, M. D.
Wood's Corners, Ionia Co., June 6, 1883.

REPLIES BY J. A. BAUGHMAN, M. D., OF WOODLAND, BARRY CO., MICH.

1. † 300. Village not incorporated.
2. 2.
3. 7 miles square.
4. 25 per cent less.
5. 25 per cent less.
6. None.
8. Malaria.
9. Better drainage.
17. Scarlet fever, 2; typhoid fever, 2; measles, 4; whooping-cough, 6; cerebro-spinal meningitis, 1; diphtheria, 13.
18. No.
19. No.
21. Pink-eye to some extent in horses.
22. No.
26. Very much grown.
27. No.
28. Part of it.
29. Greater.

30. Yes.
32. September and October.
33. July and August.
34. Jan., 2 feet 6 in., Feb., March, April, May, and June, 2 feet; July, 1 foot 9 in.; Aug., 2 feet; Sept., Oct., and Nov 1 foot 9 in.; Dec., 2 feet.
35. In wells 30 ft.; in streams 2 feet to 3 feet.
36. Jan., Feb., March, April, May, and June, 15 ft.; July, 16; Aug., 17; Sept, 15; Oct. and Nov., 14; Dec. 13.
37. July and August.
38. December.
40. Brought from a distance of ten miles, through a family visiting another who had scarlet fever.
42. Better drainage.

Very Respectfully,
J. A. BAUGHMAN, M. D.
Woodland, Barry Co., Jan. 12, 1883.

SOUTH-WESTERN DIVISION OF THE STATE.*

REPLIES BY SIMEON BELKNAP, M. D., OF NILES, BERRIEN CO. MICH.

1. † 5,300.
2. 79.
3. Niles city.
4. About one-sixth less.
5. About 12 greater.
6. Lung diseases.
8. Malarial.
9. Atmospheric causes.
10. Lung diseases.
12. Malarial and autumnal fevers.
16. Not any.
17. Scarlet fever, 3; typhoid fever, 5; measles, 3 to 500; whooping-cough, 50.
19. Yes. Whooping-cough and measles.
20. Nothing except measles.
21. There have been several cases of bowel troubles among horses attributed to feeding unripe corn, and some few cases of hog cholera in

the county.
22 and 23. No.
24. A boy about six years of age died from something like diphtheria who had played with a pet hog that died of cholera. No other cases of the disease in the vicinity.
25. Not as known.
26. Corn quite soft and unripe.
27. No.
28. Yes.
29 and 30. No.
32. Do not think any month was unusually dry.
33. From two to forty feet.
40. Very few cases.
41. Diphtheria did not occur.

Very Respectfully,
SIMEON BELKNAP, M. D.
Niles, Berrien Co., Jan. 17, 1883.

REPLIES BY MILTON CHASE, M. D., OF OTSEGO, ALLEGAN CO., MICH.

1. † 1,000.
2. 11 by record.
3. Otsego village and township; south part of Watson, east part of Trowbridge, west part of Green Plains, north part of Alamo and part of Pine Grove.
4. About the same.
5. A little above average; 5 or may be 10 per cent.
6. Diphtheria.
8. None.
10. Diphtheria.
11. I think we had a severer type of diphtheria than usual, and quack doctors were trusted to doctor it more than usual.
14. Diphtheria in October, 1882.
16. Diphtheria in October.
17. Scarlet fever, 12; measles, 30; whooping-cough, 100; diphtheria, 30.
18. Watertown, Wis., Farm, and a Buffalo, N. Y., firm. Ulcerating sores at seat of vaccination in some cases lasting three months. Profuse rash and a week's sickness, with fever at the same time. I think none of these cases came from matter from the Griffin Farm, of Fond Du Lac, Wis.
19. Yes, diphtheria in the school on Sec. 29, in Otsego township.

20. Yes, I think closing the school lessened the spread in case above referred to.
22. No.
23 and 24. None.
25. Apples mildewed, wheat was grown.
26. Wheat on clay grounds was grown; buck-wheat was very nice.
27 and 28. No.
29. Greater.
30. Clover moulty.
31. June and July unusually wet.
32. None.
33. May, June, and July.
35. Varies greatly from 6 feet to 100 feet.
37. June and July.
38. None.
40. One case of scarlet fever in the village occurred in a neat family who were willing to be quarantined and disinfected, and they did so unusually well. Brought in from Coldwater.
41. Diphtheria was introduced from Alamo, Kalamazoo Co, by relatives. Spread in school on Sec. 29 by a scholar taken sick in school. All cases can be traced to this one that occurred in this part of the town.

Very Respectfully,
MILTON CHASE, M. D.
Otsego, Allegan Co., Feb 2, 1883.

*For counties included in each division, see Exhibit 1, page 5.

REPLIES BY CHARLES P. WELLS, M. D., OF POKAGON, CASS CO., MICH.

- | | |
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| <ol style="list-style-type: none"> 1. † Unincorporated village; 300. 2. 3. 3. Pokagon village and vicinity, and a circuit of 4 or 5 miles. 4. Same as average. 5. Same as average 6. None. 8. Scarlet fever, diphtheria, measles. 9. Diseases not prevailing in this locality. 10. None. 12. There was no lessened mortality; no epidemic of any kind prevailed during the year. 14 and 15. None. 16. None more than usual. 17. Whooping-cough, 6. 18. Vaccination usually adopted among the population, with no serious cases of illness resulting therefrom. | <ol style="list-style-type: none"> 19 and 20. No. 21. None. 22. No. 23 and 24. Do not. 25. None. 26. Wheat in some instances was damaged by wet weather. 27 and 28. No. 29. More. 30. Perhaps less. 31. August, September. 35. 15 to 20 feet in the valleys, and 20 to 40 feet on upland. 37. Not unusually high. 38. Not unusually low. 40 and 41. Did not prevail. <p><i>Very Respectfully,</i> CHARLES P. WELLS, M. D.
Pokagon, Cass Co., Mich., Dec. 31, 1882.</p> |
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REPLIES BY R. F. STATTON, M. D., OF ST. JOSEPH, BERRIEN CO., MICH.

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. † Village 3,000; village and township 4,000. 2. 57. 3. Township of St. Joseph. 4. About 20 per cent less. 5. About 25 per cent greater. 6. Diseases peculiar to old age and infants, diphtheria, accidentally killed and drowned, vaccination. 7. The unusual dampness of the Winter and Spring. Universal vaccination caused the vaccine disease. 8. Pneumonia, intermittent and remittent fever, diarrhoea, dysentery. 9. The humidity of the air was unfavorable to the development of pneumonia. The cool Summer was unfavorable to the development of miasmatic and infantile diseases. | <ol style="list-style-type: none"> 10. Old age, diphtheria, and accident. 12. The diseases peculiar to Summer and Autumn. 13. The cool weather. 14. Diphtheria in May. 15. Small-pox in February. 16. Paresis; vaccinia in Feb. and March. 19 and 20. No. 28. Yes. 29 and 30. Less. 32. December. 33. April and May. 41. The cases were sporadic, and there was nothing to show contagion. <p><i>Very Respectfully,</i>
R. F. STATTON, M. D.
St. Joseph, Berrien Co., Jan. 17, 1883.</p> |
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SOUTHERN-CENTRAL DIVISION OF THE STATE.*

REPLIES BY BION WHELAN, M. D., OF HILLSDALE, HILLSDALE CO., MICH.

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| <ol style="list-style-type: none"> 1. † 4,000. 2. 35. 3. Hillsdale city. 4. 25 per cent less. 5. Less. 8.75 to the thousand in 1882. 12.25 to the thousand in 1881. 6. Diseases of the heart. 7. No unusual prevalence. 8. Malarial disease. 9. No excessively hot term following a season of wet weather. 10. Diseases of the heart. 11. No specific reason, the mortality being mostly among the very old. 12. Malarial. 13. No excessively hot term following a season of wet weather. 14. None. 15. Malarial and scarlet fevers, and diphtheria. 16. None. 17. Scarlet fever, 3; measles, 3; whooping-cough, 25 (estimated); diphtheria, 5. 18. 2 cases of severe illness, one virus from Health Office at Chicago, one from the New England Vaccine Co. 19 and 20. No. 21. Nothing epidemic among animals. 22. No. | <ol style="list-style-type: none"> 23. Know of no injurious effects. 24. No such case. 25. Some mildew amounting to perhaps ten per cent. 26. Not in as good condition as usual, owing to the influence of rains during harvest. 27. Some smut corn. 28. Yes. 29. Greater. 30. More. 31. December, August, July, September, November, February, January, October, June, May, April, March. 32. December. 33. March, April, May, and June. 37. March, April, May, June. 38. December. 40. 3 cases of scarlet fever, origin of two from being exposed outside the city; origin of third unknown. 41. 4 cases of diphtheria all in one family communicated to none outside; origin believed to be exposure of children to cold and damp during the spring months. <p><i>Very Respectfully,</i>
BION WHELAN, M. D.
Hillsdale, Hillsdale Co.</p> |
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REPLIES BY A. R. SMART, M. D., OF HUDSON, LENAWEE CO., MICH.

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. † Incorporated village, 2,300. 2. 14. 3. An area of 3 miles radius from Hudson. 4. Slight increase. 5. About the same. 6. Influenza, catarrhal diseases, rheumatism, and scarlet fever. 7. Atmospheric conditions. 8. Less fevers and bowel diseases, especially among children. 10. None. | <ol style="list-style-type: none"> 12. From fevers and bowel diseases less mortality among infants. 13. Less continuous heat. 14. None. 15. Less mortality from Summer complaints and fevers. 16. None. 17. Scarlet fever, 12; typhoid fever, 20; whooping-cough, few cases; diphtheria, few mild cases. 18. None. 19. Yes, scarlet fever and diphtheria. |
|---|---|

*For counties included in each division, see Exhibit 1, page 5.

20. No, did not prevail except during school terms.
 22. Among hens quite extensively during Summer and Fall.
 23. No.
 24. None.
 25. Apples rotted quickly.
 26. Good generally.
 27. No.
 28. Yes.
 29 and 30. Less.

35. From 20 to 60 feet.
 37. Don't think it was unusually high.
 38. In the fall.
 40. Scarlet fever originated in a family in the country, 5 miles from town; gradually spread by the medium of schools chiefly.
 41. Same thing true as in 40.

Very Respectfully,

A. R. SMART, M. D.
 Hudson, Lenawee Co., Mich., March 24, 1883.

REPLIES BY A. A. DUNTON, JR., M. D., OF JEROME, HILLSDALE CO., MICH.

3. † In and about the village of Jerome, Mich.
 4. Less. It was exceedingly healthy; very little disease, and that mostly chronic troubles.
 5. I should say from one-third to one-half less.
 6. None.
 8. Fevers, bowel troubles, and pneumonia, in fact all acute diseases.
 9. To the cool summer and steady winter weather.
 12. All acute diseases.
 13. To the lessened severity of acute diseases due to steady temperature.
 16. An epidemic of tonsillitis.
 17. Typhoid fever, 1; whooping-cough, 40.
 19. Yes. Whooping-cough.
 21. Horses have been sick a great deal with one or another of the forms of epizootic, more latterly with pink eye. Hogs I have not heard so much

- of as last year.
 22. No.
 25. Wheat and oats were terribly damaged by the rains just after they were cut.
 26. Wheat terribly poor and oats good mostly.
 27. Corn with smut.
 28. No.
 29. Greater.
 30. Less.
 31. Cannot do that, but the fore part of Spring and Summer quite dry; last part of Summer and Fall wet.
 32. April, May, and June, fore part of July.
 33. Last of July, August, September.
 35. 10 feet.
 37. It has been higher than usual all the year.

Very Respectfully,

A. A. DUNTON, JR., M. D.
 Jerome, Hillsdale Co., Jan. 23, 1883.

REPLIES BY H. C. CLAPP, M. D., OF MENDON, ST. JOSEPH CO., MICH.

1. † About 900.
 2. 6; one from old age.
 3. A radius of 6 miles.
 4. Diminished about one-eighth.
 5. About the average.
 6. None, with the exception of a few congestive attacks during the latter part of the Winter and early Spring.
 7. The cause of those congestive attacks was supposed to be the immediate effect of drawing off the pond situated on the west side of the village.
 8. Malarial.
 9. To the ultimate effect of drawing off mill pond and general drainage of marshes.
 10. Old age and consumption.
 11. Had two fatal cases of congestive chills in the village, one in January 28 and May 8; supposed to be the result of drawing off the pond, both being near it.
 12. Malarial.
 13. The same as mentioned under question 9, although the immediate effect of drawing off mill pond was unfavorable.
 17. Scarlet fever, 5; whooping-cough, many; diphtheria, 1; mumps, many.
 18. None; but great difficulty in making virus work. Procured it of Dr. E. L. Griffin, of Fond Du Lac, Wis.
 19 and 20. No.
 21. Only some little sickness, with some mor-

- tality during the Fall among hens.
 22. No, unless that was the disease among hens.
 26. Wheat was very wet when harvested, and much of it was wet and grown when threshed.
 27. No.
 28. Much of it.
 29. Greater.
 30. No.
 31. Dec., Nov., Oct., Sept., Aug., July, June, April, May, Feb., Jan., March.
 32. Dec., Nov., Oct.
 33. March, Jan., Feb.
 35. About 22 feet in the village. I think all the wells are now dry which have not been deepened.
 37. January and March.
 38. Since the drawing off the mill pond in Dec., 1880, the wells within the village limits have been lowering, and during the past 4 months three-fourths of them have failed *entirely*.
 40. The 5 cases occurred in Feb., March, Aug., and Oct.; two in March and one in each of the other months. All were isolated cases, and could not be traced to a communicable cause.
 41. One case only, in June; a young girl, who stated that she had been to a place a few days previous where the children had "sore throat."

Very Respectfully,

HORACE C. CLAPP, M. D.
 Mendon, St. Joseph Co., Jan. 3, 1883.

REPLIES BY RALPH P. BEEBE, M. D., OF UNION CITY, BRANCH CO., MICH.

1. † Incorporated village, about 1,400 inhabitants.
 2. 8.
 3. Union City corporation.
 4. About one-third less.
 5. Nearly one-half less.
 6. None.
 8. Typhoid fever, pneumonia.
 10 and 12. None.
 14, 15, and 16. None.
 17. Typhoid fever, 4; diphtheria, 5.
 18. None.
 19 and 20. No.
 21. None that I know of.
 22, 23, and 24. No.

25. Smut in corn and oats; apples rot early; hay more mould and mildew.
 26. The greater part in good condition.
 27. More in corn and oats than usual.
 28. The greater part.
 30. More.
 31. Dec., Nov., Oct., Sept., Feb., May, Jan., April, March, Aug., June, July—from memory.
 32. Dec., Nov.
 33. July, Aug.
 35. Forty feet. Along river flat 6 to 18 feet.
 37. July and August.
 38. Dec. and Nov.
 40. None.
 41. Sporadic; in three families, were isolated

† The figures beginning paragraphs refer to questions in Circular 59, printed (in small type) on pages 1-18 of this Report. A summary of the replies is printed on same pages.

so no other families were exposed.

42. I think if better ventilation could be had in our houses and school buildings, it would prevent some chronic diseases, as tubercular and scrofulous; and diphtheria could be prevented if vegetable matter was not allowed to decay

around houses so as to contaminate water and air. I am quite positive on the last from a few cases of observation.

Very Respectfully,

RALPH P. BEEBE, M. D.

Union City, Branch Co., Jan. 1, 1883.

REPLIES BY EDWARD H. HURD, M. D., OF UNION CITY, BRANCH CO., MICH.

1. † 1,500.
2. 12. Taken from the book of undertaker. Eight deaths occurred during the year from a population of upward of 1,600, included within a circuit of about 4 miles, from the following causes: 1 Bright's disease, 1 dropsy, 1 organic disease of heart, 1 old age. All the foregoing of persons in advanced years. 1 typho-malarial fever, 1 puerperal convulsions, 1 influenza, 1 gun shot wound.
3. About 5 miles each way from village.
4. Rather more.
5. Nearly one-quarter less.
6. Old age, apoplexy, and consumption.
8. Malarial diseases are steadily diminishing in this vicinity.
9. Better hygiene, better drainage of the land, less breaking up of new land, better care of individuals.
10. Old age, apoplexy, and consumption.
12. Malarial diseases are steadily diminishing in this vicinity.
13. See reply to No. 9.
14. See Nos. 6 and 10, which were scattered throughout the whole of the year about evenly.
16. None.
17. Typhoid fever, 9; measles, 20; whooping-cough, 25; diphtheria, 12; whooping-cough estimated.
18. I do not.

19. Not that I have been able to trace.
20. No.
21. Do not know of any.
22. No.
- 23 and 24. I do not.
25. Corn about the same amount of smut as usual; some of the hay mouldy.
26. Wheat grown in places badly, and some of it damp when secured.
28. No.
29. Have not heard of any.
30. More.
31. The latter part of August and September, and first of October. The other months unusually wet.
32. None.
33. Nearly or quite all.
35. About 35 feet on north side of river, from 20 to 25 on south side of the river.
36. Do not think it varied much during the year.
40. No cases reported.
41. In two or three families diphtheria seemed to break out about the same time without any apparent cause. In a few cases decomposing organic matter seemed to furnish the disease.

Very Respectfully,

EDWARD H. HURD, M. D.

Union City, Branch Co., April 30, 1883.

REPLIES BY EDWARD BATWELL, M. D., OF YPSILANTI, WASHTENAW CO., MICH.

1. † 6,000.
3. The city of Ypsilanti.
4. Average.
5. Same as average.
6. Typhoid fever.
8. Consumption.
9. Dry atmosphere.
10. Many deaths from typhoid fever.
12. Consumption.
16. A few cases of diphtheria occurred.
17. Scarlet fever, 10; typhoid fever, 36; whooping-cough, 4; diphtheria, 8.
19. No.
20. Have never closed our schools, believing that children ran no greater risk in the school-room than playing together on the streets.
25. Not in this locality.
26. Good.
27. Heart of none.
28. No.
30. Less.
31. October, August.
32. It was not discernible.
34. Jan., Feb., March, April, May, June, and

- July, 30; Aug. and Sept., 28; Oct., 26; Nov. and Dec., 30.
35. 30 on west side of Huron river; 35 to 40 feet on east side.
38. October.
40. Four cases of scarlet fever were brought here by students to the normal school. The others originated here, and had no apparent cause of origin, and occurred at different times, and in far separated localities.
41. Two cases of diphtheria were brought here from Detroit. Two originated here (at least were reported as diphtheria) in August. The other cases reported to the Board of Health as diphtheria were very doubtful, both as to origin and correctness of diagnosis. If membranous croup and diphtheria are identical, as asserted by some authors, we have had more cases than are reported above. I most emphatically deny the correctness of this theory.

Very Respectfully,

EDWARD BATWELL, M. D.

Ypsilanti, Washtenaw Co., Jan. 6, 1883.

SOUTH-EASTERN DIVISION OF THE STATE.*

REPLIES BY JUDSON BRADLEY, M. D., OF DETROIT, MICH.

1. † 135,000, including suburbs.
2. 2,700.
3. Detroit and suburbs.
4. About the average.
5. Average.
6. Diphtheria.
8. Cholera infantum, cholera morbus.
9. Cool season.
10. Diphtheria.
11. Greater virulence of the disease; cause not known.
16. Typhoid fever Sept. and Oct., 1882.
17. Diphtheria, 910. The mean percentage of deaths to cases in diphtheria is 20; thus, 182 deaths multiplied by 5=910 cases.
18. Do not know of any.

19. Yes, diphtheria, probably, and scarlet fever.
20. Schools did not close.
- 40 and 41. Do not know how scarlet fever or diphtheria were introduced. They were communicated by careless contact, visiting from family to family, etc.
42. Isolation seems to prevent spread of scarlet fever and diphtheria if it can be done faithfully and honestly, but there seems to be the trouble; people will not do it. It is more important to have a "wake" than to prevent the spread of disease.

Very Respectfully,

JUDSON BRADLEY, M. D.

Detroit, Wayne Co., April 11, 1883.

* For counties included in each division, see Exhibit 1, page 5.

REPLIES BY J. M. SWIFT, M. D., OF NORTHVILLE, WAYNE CO., MICH.

1. † 1,000.
 2. 9.
 3. Village of Northville, one mile square.
 4. A little less; not much, but less of severe symptomatic disease.
 5. Two-elevenths less.
 6. None.
 8. Typho-malarial.
 10. None.
 12. Old age.
 - 14, 15, and 19. None.
 17. Scarlet fever, 6; cerebro-spinal meningitis, 1; diphtheria, 5.
 18. None.
 19. No.
 21. None.
 22. No.
 23. None.
 24. I do not.
 25. None.
 26. Wheat was bad from rains.
 27. No.
 28. Fairly so.
 31. Last of July and August especially wet.
 32. None of them.
 33. August.
 35. From 25 to 50 feet, except the springs, which are numerous.
 38. None.
 39. Diphtheria of malignant form brought from Detroit on clothing.
 42. A law carried into execution, with heavy penalty, for leaving infected localities until a permit from competent authority is granted.
- Very Respectfully,*
J. M. SWIFT, M. D.
Northville, Wayne Co., Jan. 22, 1883.

REPLIES BY E. P. CHRISTIAN, M. D., OF WYANDOTTE, MICH.

1. † 3,500.
 2. I think about 50.
 3. City of Wyandotte.
 - 4 and 5. Average.
 6. Scarlet fever.
 8. Typhoid fever less than for several years.
 9. Wells were not so low, that is, more water in the wells.
 10. Scarlet fever.
 12. Typhoid fever, cholera infantum in Summer.
 13. See answer to 9.
 14. None.
 17. These cases in my own practice representing probably one-third of the total. Scarlet fever, 40; typhoid fever, 10; measles, 25; whooping-cough, few; diphtheria, 25.
 19. Scarlet fever and measles.
 20. Schools were not closed, but attendance much diminished, which it is believed checked the spread of scarlet fever and measles.
 - 23 and 24. Know of none.
 25. Rot in potatoes; apples rotted badly.
 26. Generally good.
 28. Some damaged.
 30. Generally good.
 32. Not at any time as compared with previous years.
 33. The wells did not become dry during the season, contrary to what is usual in Summer and Fall.
 35. From 2 to 10 feet.
 37. In the spring.
 40. How first scarlet fever came in town I do not know, but it was introduced into the schools from whence it spread; also spread by neighborly visitation of the sick.
 41. By same means as scarlet fever.
- Very Respectfully,*
E. P. CHRISTIAN, M. D.
Wyandotte, Wayne Co., Jan. 5, 1883.

The following reply was received too late for the compilation :

BAY AND EASTERN DIVISION OF THE STATE.*

REPLIES BY JOHN S. CAULKINS, M. D., OF THORNVILLE, MICH.

3. † The township of Dryden and of Attica, Lapeer and Metamora adjacent.
4. Less; diminished about 60 per cent.
5. Less; diminished by 30 per cent.
6. None.
8. Nearly all diseases; especially malarious and typhoid fevers.
9. To three causes: 1st, the non-occurrence of epidemics of malignant or serious diseases; 2d, favorable climatic conditions of the year; 3d, increasing general healthfulness of the locality.
10. There was an unusual number of deaths from extreme old age during the year 1882; 4 decedents out of 12 were over 80; several others were over 70.
11. No cause for the unusual mortality among old people can be assigned, it was probably accidental.
12. From all others except old age.
13. To the cases mentioned above under heading 9.
14. There were none.
15. Nearly all diseases had an unusual low rate of mortality during the year.
16. No diseases occurred that were not common to the locality.
17. Scarlet fever, 1; typhoid fever, 4; diphtheria, 4.
18. No such cases are known.
19. No.
20. No schools were closed during the year on account of communicable diseases.
21. No diseases were prevalent among animals in 1882, except the "pink eye" to a very limited extent among horses. This disease seems to be a catarrhal fever with a considerable mortality.
22. No.
- 23 and 24. No such facts are known.
25. No diseases occurred among the crops except smut in corn and oats.
26. All were in good condition except a part of the wheat, which was grown, and some of the corn, which was milled, on account of being put in the crib too wet.
27. Corn and oats were affected by smut.
28. Some of it was wet.
29. A greater proportion.
30. More.
31. Sept., Dec., July, Nov., Jan., Feb., April, Oct., March, June, Aug.
32. In September.
33. In May, June, and August.
35. From 20 to 100 feet.
38. Jan., 17 ft. 6 in.; Feb., 17 ft. 6 in.; March, 16 ft. 11 in.; April, 16 ft. 6 in.; May, 16 ft. 4 in.; June, 16 ft. 8 in.; July, 16 ft. 3 in.; August, 16 ft. 6 in.; Sept., 16 ft. 6 in.; Oct., 16 ft. 9 in.; Nov., 16 ft. 6 in.; Dec., 16 ft. 6 in.
37. In Nov.
38. In Jan and Feb.
42. Under this heading attention is called to the possible danger to young children from the use of a milk bottle which is the prevalent style here and probably widely so. In this bottle the milk is drawn to the child's mouth through a rubber tube about six or eight

* For counties included in each division, see Exhibit 1, page 5.

† The figures beginning paragraphs refer to questions in Circular 59, printed (in small type) on pages 1-18 of this Report.

inches in length. The small size of this tube makes the satisfactory cleansing of it impossible, except by the forcible and continuous injection through it of a stream of water. If this precautionary measure should be neglected (which would nearly always be the case) putrefactive changes would take place in the interior of the tube, and contamination of the milk with perhaps serious results to the children. Chemical poisons might be generated, or disease-germs find a lodgment and developing place in a neglected and foul tube of this kind,

to the great detriment of the helpless infant obliged to take his nourishment through it. In two fatal cases of cholera infantum observed last summer the children were fed from the style of bottle referred to above. This of course may be a mere coincidence, but it is a sufficiently striking one to make the bottle an object of suspicion to the sanitarian.

Very Respectfully,

J. S. CAULKINS, M. D.

Thornville, Lapeer Co., July 13, 1883.

REPORT OF CORRESPONDENCE RELATIVE TO FLOODING LANDS IN MONTCALM COUNTY.

BY HON. JOHN AVERY, M. D., PRESIDENT OF THE STATE BOARD OF HEALTH.

GENTLEMEN OF THE STATE BOARD OF HEALTH:—The following correspondence relative to flooding of lands is respectfully submitted. In May last I received the following letter from Ephraim Follett, Esq., of Sheridan, Montcalm county.

OFFICE OF EPHRAIM FOLLETT,
ATTORNEY AND SOLICITOR, NOTARY PUBLIC,
SHERIDAN, MONTCALM CO., MICH., May 17th, 1883. }

Dr. John Avery,

DEAR SIR:—On Fish creek are several dams the log-runners are flooding every day, or nearly every day. Complaint has been made to me that the flooding is causing the people to be sick. The dam will set back the water over a large tract of land, then it is drawn down low, then raised. What, in your judgment, is the most proper and at the same time most effectual course to be pursued to abate the matter? Has the township got to proceed by injunction? I would be glad to hear from you soon in regard to the matter.

Yours, truly,

EPHRAIM FOLLETT.

To this letter, I replied as follows:

GREENVILLE, MICH., May 20, 1883.

Ephraim Follett, Esq., Sheridan, Mich.

DEAR SIR:—Your letter of the 17th inst. was received yesterday too late to answer at an earlier date. And in reply, I have to say that the complaint made by citizens living along Fish creek is one that has often been made to this Board; and it is one about which the Board has great difficulty in giving satisfactory and practical advice.

The money interests involved in the running of logs in our streams make it a difficult one to deal with. Our water-courses are free, and booming companies and owners of logs are entitled to all the water that naturally runs in them to run their logs. But they have no right to draw ponds or flood adjacent lands to the injury of the public health; and the law confers upon the local boards of health and the courts ample authority to prevent them from doing so. A dam, if a nuisance, may be destroyed or removed by order of any local board of health within whose jurisdiction it may be situated, after proper notice to owners, and subject always to the penalties of the law, provided it be declared not to be a nuisance. The circuit court may grant an injunction restraining the owners of any dam from draining a pond when injury to the public health is likely to result.

But the practical difficulty presents itself, how can the order of the local board or of the court be enforced. The pecuniary interests involved are so great that interested parties will violate orders and injunctions, submit to arrests, pay fines, protect their dams, continue to draw ponds and to run their logs unless prevented by force.

An attempt a few years since to enforce the law on Flat river, proved a failure, even after a military company from Grand Rapids was called to aid the authorities. The law is sufficient, but there does not seem to be any practicable way to enforce it. And so, unless the local board is prepared to enter upon a big fight, and to maintain it with force, if necessary, I can see no way to prevent the injury to the public health, where so great private interests are involved, and where interested parties are prepared to protect their interests with so large a force as booming companies and log owners have at their command. I am very respectfully yours.

JOHN AVERY,
President State Board of Health.
JOHN AVERY.

Respectfully submitted,

VENTILATION OF WORKSHOPS AT THE STATE HOUSE OF CORRECTION, AT IONIA, MICH.

RECOMMENDATIONS BY HON. JOHN AVERY, M. D., PRESIDENT OF THE STATE
BOARD OF HEALTH.

GENTLEMEN OF THE STATE BOARD OF HEALTH:—As the result of my visit to Ionia, Sept, 4, 1883, I made the following suggestions to the warden of the State House of Correction, a copy of which I have sent to him.

Respectfully submitted, JOHN AVERY.

D. R. Waters, Warden State House of Correction, Ionia, Mich. :

SIR:—As the committee from the State Board of Health, to advise about the ventilation of the workshops in the State House of Correction, I would suggest, as the best that can be done with the limited means at your disposal, that you utilize all chimneys and ventilating flues now in the shoe and cigar shops, by putting in foul-air registers at the floor, of the full capacity of the chimneys and flues; and by heating the chimneys and flues by means of steam coils connected with the coil running along the side of each shop. Do not ventilate the upper and lower shops into the same flues, but use separate ones for each; a part of the existing flues for the upper, and a part for the lower shops. Ventilate each shop from both sides. If the present ventilating-flues open into the attic they should be carried separate up through the roof. Close all the present openings into these flues at or near the ceiling.

While these suggestions, if carried out, will by no means give perfect ventilation, as they provide only for the removal of foul air, but make no provision for the introduction of pure, warm air, they will be a great improvement over the present system of no ventilation, and is probably the best that can be done with the very limited appropriation at your command (\$200).

I am very truly yours, JOHN AVERY,
Member State Board of Health.

REPORT OF INVESTIGATION OF AN ALLEGED NUISANCE CAUSED BY A TANNERY IN THE VILLAGE OF FREMONT.

BY HON. JOHN AVERY, M. D., PRESIDENT OF THE STATE BOARD OF HEALTH.

GENTLEMEN OF THE BOARD:—In compliance with a request made to this Board, by N. B. Clark, of village of Fremont, at the sanitary convention held in Reed City April 26 and 27, and with the request by this Board, I visited that village on Tuesday, May 7, 1883, for the purpose of investigating the condition of the tannery and fertilizing works of Gerber & Sons. Upon arriving in that village I was met by the Gerber sons, Dr. Nafe, health officer of the village, and Dr. McNabb, health officer of the township, who showed me every courtesy and facility for a thorough examination of the works.

I found the tannery (a building 86 by 156 feet) located about 150 feet from the depot, and 40 feet west of the main street leading from the depot to the village. In front of the tannery, and between it and the street, the ground is wet and springy, and from it and through it flows a small stream of water to the creek about 100 feet to the south. A large portion of this ground was covered with brush and logs, and a small portion near the tannery was used as a temporary dumping ground for the fleshings from the works. The ground to the south and west of the tannery was originally low and wet, but is now covered with the waste tanbark from two to three feet deep.

In this tannery about five hundred tons of hides are tanned annually. It has 156 vats, and employs 25 men. The fleshing from this amount was formerly deposited upon the ground around the building and covered with the waste tanbark. The fertilizing works were added mainly as a means for a safe and economic disposition of this waste material. They are situated about one hundred feet south from the tannery, and near the street, and consist mainly of a building about 16x20 feet, and a sheet iron rendering tank in which the fleshings are cooked by means of steam introduced from the boiler in the tannery.

The stench arising from this steaming process, and the unsightly appearance of the front of the tannery, are the principal sources of complaint from the citizens.

To remove these as far as possible, your committee recommended that a covered drain be laid in front of the tannery following the course of the rivulet, and deep enough to receive the drainage from the tannery, and that the front be cleared of brush and logs and filled with tanbark; also, that the fertilizing-house be moved up to the southeast corner of the tannery, and the steam from the rendering tank be conducted into the smoke-stack arising from the engine-room of the tannery. Your committee is of the opinion that the heat of the smoke-stack will deodorize the vapors from the rendering tank, or at least carry them so high as to render them innocuous and unobjectionable to any one.

These recommendations were received in a very kindly manner, and a faithful compliance with them promised by the proprietors of the tannery.

Respectfully submitted,

GREENVILLE, *July 6, 1883.*

JOHN AVERY.

IMMIGRANT-INSPECTION SERVICE IN MICHIGAN.

Including a Report of Inspections from Oct. 1, 1882, to May 31, 1883, and a Summary for the Year Ending May 31.

BY THE SECRETARY OF THE STATE BOARD OF HEALTH.

A history of the establishment of the immigrant-inspection service in Michigan, by the joint action of the State Board and the National Board of Health, and a report of inspections for the four months from June 1, to September 30, 1882, were given on pages 436-443, of the Report of this State Board for 1882. This paper continues the subject, and completes the report for the eight months from October 1, 1882, to May 31, 1883, being the remainder of the year for which the inspection-service was in force in this State.

Congress not having made the necessary appropriation for the work of the National Board of Health, it was feared that the inspection-service must be discontinued. August 31, 1882, the National Board gave notice that the service would be continued provided that the \$50,000 appropriated in the civil sundry bill, approved August 7, were placed at the disposal of that Board for aid to State and local boards in carrying out their regulations. September 15, the National Board gave notice that unless otherwise advised in the meantime, the service would be closed October 1. In justification of this action, the National Board referred to the probable falling off in number of immigrants during the fall and winter, and to the hope of renewing the service in the spring when immigration should again increase.

In reply to this, representations were made of the importance of continuing the service during the winter, when the communicable diseases for which this inspection was made spread more rapidly; and especially of the importance of continuing it at Port Huron and Detroit, which are on the frontier where inspection tends to protect the whole Northwest, even if it should be discontinued at some interior points.

September 28 the National Board gave notice that the inspection-service would continue during the month of October, at reduced compensation to inspectors, at stations as follows: At Port Huron, one inspector and an assistant; at Detroit, one inspector; at Western Division (Chicago), two inspectors and four assistants; at New York quarantine station, at Baltimore, at Philadelphia, and at Indianapolis, each one inspector; the inspectors at Pittsburg, Pa., Hornellsville and Rochester, N. Y., Grafton, W. Va., and Cleveland, O., being discontinued.

The force of inspectors being reduced, the National Board was notified that the work done by the inspectors would necessarily be less, and that inspectors

in Michigan had been instructed to make the reduction of work in vaccination of immigrants rather than in inspection as to the presence of communicable diseases and of the infection of such diseases.

The importance of continuing the inspections during the winter at Port Huron and Detroit was again urged on the National Board. The following letter was sent in October:

MICHIGAN STATE BOARD OF HEALTH, }
OFFICE OF THE SECRETARY.
Lansing, Mich., Oct., 11, 1882. }

Dr. Chas. Smart, Secretary National Board of Health, Washington, D. C. :

DEAR DOCTOR:—This State Board of Health met yesterday, and directed me to express to the National Board of Health the earnest wishes of this Board for the continuation of the immigrant-inspection service at Port Huron and Detroit during the coming winter, because the disease which the inspection-service is mainly intended to prevent entering into this country is small-pox, and that disease is usually more prevalent in the winter months, especially in the portion of the country from whence the large portion of the immigrants come in those months, namely the lower portion of Canada, where small-pox is nearly always present. And, again, because there are more immigrants entering the country for the first time by way of Port Huron than by any other port besides New York, and many of these arrivals have not had any previous inspection. If the inspection is not continued at Port Huron and Detroit there will be a constant danger of small-pox coming into this country from the sources mentioned, especially as there is no adequate system of quarantining the vessels which bring immigrants to Montreal; neither are the immigrants examined in Montreal (where they should be examined) or, in the majority of instances, even examined on ship-board, as is the case on the vessels which bring immigrants to American ports. The inspection in the interior may be made less expensive than it has hitherto been, or is even now, without imperiling the country, providing the inspections on the frontier are kept up, and kept uncrippled for lack of men with which to perform proper inspection and vaccination. The inspectors at Port Huron and Detroit have but barely left the trains on which they are working when the inspectors from Chicago get on board, and go through the inspection again, before there is really any danger that small-pox has developed. It is not necessary to have the inspectors at Chicago work the railroad from Port Huron into Chicago, or from Detroit into Chicago, on this account, that is if the inspection at these points can be allowed to go on in the same manner it did before October 1. I do not know about the relative importance of the inspections on lines which bring immigrants directly into Chicago by other lines which do not pass through Michigan, but I do think, and this Board believes, that the service should be kept up at the frontier points, even at the sacrifice of all inspections at the interior points. If the service is to be crippled at all points, it will be nowhere as safe as it would be if it was strong at the points of entry. The inspections in this State are carried on as best they can be with the reduced force of inspectors during the month of October, but this Board hopes and asks that it will be resumed again at the close of the month as it was before the introduction of the new order, on October 1. By direction of the Michigan State Board of Health.

Very respectfully,
HENRY B. BAKER, *Secretary.*

The National Board authorized the continuance of the inspections during November at the reduced compensation, and with the same number of inspectors, in Michigan, as before October; and afterward authorized that they be continued till December 15.

It had been hoped that the President of the United States would place at the disposal of the National Board the fund of \$100,000 authorized by Congress to be expended at his discretion in the prevention of epidemics. And it was strongly urged upon him by this Board and by other State Boards of Health and sanitary organizations to place this fund at the disposal of the National Board of Health. When, however, this was placed at the disposal of the Marine Hospital Service, it was hoped that Congress would make an appro-

priation for the specific purpose of enabling the National Board to aid State Boards in maintaining the needed inspection-service to prevent the introduction and spread of contagious diseases.

In order better to set forth the necessity for continuing the inspections the secretary of this State Board of Health, by advice of other members of the Board, attended, in December, at Washington, a meeting of the National Board of Health, and also a meeting of the representatives of State and other Boards of Health. The action at these meetings, in relation to this subject, appears in the following communication from the National Board of Health, relative to a continuation of the immigrant-inspection service (47th Congress, 2d Session.—Senate—Mis. Doc. No. 9), which communication was also transmitted to the House of Representatives.

In the Senate this communication was “Laid before the Senate by the President *pro tempore*, ordered to be printed, and referred to the Select Committee to investigate and report the Best Means of Preventing the Introduction and Spread of Epidemic Diseases.” In the House it had a similar reference.

NATIONAL BOARD OF HEALTH. }
Washington, D. C., December 13, 1882. }

SIR:—At a meeting of the National Board of Health, held this day, a statement, embodying the views of the representatives of certain State and local health boards as to the importance of continuing the immigrant-inspection service, conducted under the auspices of the National Board, was submitted, and on motion the following resolutions were adopted:

That the statement submitted expresses, we believe, the opinion of the more prominent sanitarians of the North and West upon the subject of immigrant inspection, and seems to this Board eminently wise and just.

That the president transmit a copy of it to the President of the Senate, Speaker of the House of Representatives, and to the chairmen of the Committees on Public Health in the House and Senate.

In accordance with the terms of the above resolution, I herewith respectfully transmit a copy of the statement in question; and am, sir,

Very respectfully, your obedient servant,

HON. DAVID DAVIS,
President of the Senate.

J. L. CABELL,
President National Board of Health.

[The statement referred to is as follows:]

WASHINGTON, D. C., December 12, 1882.

At a meeting of representatives of State and other boards of health, who have come here to place before the National Board of Health the importance of continuing the sanitary inspection of immigrants for the prevention of the introduction of contagious diseases into this country, and their spread throughout the country, W. M. Smith, M. D., health officer of the port of New York, was chosen chairman, and Dr. Henry B. Baker, secretary of the Michigan State Board of Health, was chosen secretary.

The subject having been verbally presented to the National Board of Health, at its meeting this day, and the Board having requested a summary statement in writing of the views of those present, the subject was discussed at some length, and a communication to the National Board of Health was formulated as follows:

To the National Board of Health:

GENTLEMEN:—The undersigned respectfully represent that the maintenance, at the principal ports of entry in the United States, of an efficient sanitary inspection of immigrants as to their protection from small-pox, and as to their liability to communicate that disease, is necessary to prevent the frequent introduction of small-pox and other contagious diseases among the people of this country; and that such inspection is necessary to secure efficient action at ports of departure and on board ships on the part of the transatlantic steamship lines engaged in the transportation of immigrants.

There is also urgent need for constant watchfulness to detect contagious disease occurring in immigrants after they have passed the ports of entry—the disease not having appeared when they were examined at the port of entry.

We therefore urge upon you the necessity for continuing such inspections as have been established.

This inspection-service is such that its benefits have no relations to State boundaries, but its pro-

tective influences extend widely throughout this country, consequently expenses therefor should not properly be borne by any local or State Board of Health. We believe that it is the duty, and one of the highest duties, of the national government to maintain this inspection-service whenever needed in this country.

In our opinion, the sum of \$25,000 will be sufficient for this service during the remaining months of this fiscal year.

WM. M. SMITH,
Health Officer, Port of New York.

JOHN H. RAUCH,

Secretary State Board of Health of Illinois.

H. R. MILLS, M. D.

HENRY B. BAKER,

Secretary Michigan State Board of Health.

We concur in this report and the recommendations.

ELISHA HARRIS, M. D.,

Secretary State Board of Health, New York.

W. SNIVELY, M. D.

City Physician, Pittsburgh, Pa.

J. E. REEVES, M. D.,

Secretary State Board of Health, West Virginia.

JOHN J. SPEED, M. D.,

Secretary State Board of Health, Kentucky.

O. W. WIGHT, M. D.,

Health Officer, Detroit, Mich.

THAD. M. STEVENS, M. D.,

Secretary State Board of Health, Indiana.

E. S. ELDER, M. D.,

Health Officer, Indianapolis, Ind.

J. T. REEVE, M. D.,

Secretary State Board of Health, Wisconsin.

ROBERT MARTIN, M. D.,

Commissioner of Health, Milwaukee, Wis.

OSCAR C. DEWOLF, M. D.,

Commissioner of Health, Chicago, Ill.

R. J. FARQUHARSON, M. D.,

Secretary State Board of Health, Iowa.

W. W. CANTWELL, M. D.,

Health Officer, Davenport, Iowa.

G. C. CRAIG, M. D.,

Commissioner of Health, Rock Island, Ill.

W. B. CONERY, M. D.,

Saint Louis Board of Health.

E. M. HUNT, M. D.,

Secretary State Board of Health, New Jersey.

T. L. NEAL, M. D.,

Health Officer, Dayton, Ohio.

At its regular quarterly meeting, Jan. 9, 1883, the State Board of Health adopted the following preamble and resolution, which were duly transmitted to members of Congress from Michigan:

WHEREAS, This Board has long been laboring for the restriction and prevention of contagious diseases in Michigan, which depend greatly upon the existence of such diseases in other States and countries; and as this Board has been able to trace several outbreaks of diseases in this State during the past year to immigrant travel, etc., therefore—

Resolved, That this State Board of Health urgently requests our members of Congress to endeavor to secure the passage of a bill to appropriate \$25,000 for the remainder of this fiscal year and thereafter at about the same rate, to enable the National Board of Health to cooperate with State and local boards of health and quarantines in efforts to prevent the introduction of contagious diseases into the United States, and their spread from one State to another.

Bills to provide for such an inspection-service, by enabling the National Board of Health to aid State and local boards of health were introduced by Senator Conger and Representative Rich, but each failed to become a law.

Jan. 31, 1883, at a special meeting, held at Pontiac, the State Board of Health adopted the following preamble and resolutions, which were duly forwarded to Michigan members of Congress:

WHEREAS, The work of the National Board of Health has been seriously crippled by reducing its appropriation, and by transferring to another branch of the government service important parts of its legitimate work and means for usefulness;

Resolved, That, in our opinion, no other government service is so well qualified to perform the health service of the United States as is the National Board of Health, which has shown by its works its ability to do what was assigned to it, and to gain and retain the confidence of sanitarians throughout this country;

Resolved, That we consider it of the highest national importance, as also of great importance to this State, that the National Board of Health shall receive annually an appropriation sufficient to enable it to carry on the important work of protecting the country from the introduction of contagious diseases; of collecting and distributing for the guidance of State and local boards of health information relative to the prevalence of diseases, and particularly of contagious diseases; of investigating by specially qualified experts the obscure causes of diseases, and of publishing to the world the results of its studies and investigations, more especially concerning diseases which, like diphtheria and small-pox, spread generally throughout the country;

Resolved, That a copy of this preamble and resolutions be forwarded to each member of Congress from this State.

At its regular quarterly meeting, April 10, 1883, the State Board of Health

directed the secretary to memorialize the President of the U. S., asking him to place at the disposal of the National Board of Health for the continuance of the immigrant-inspection service and for the prevention of epidemics a second contingent epidemic fund of \$100,000, which had been authorized by Congress in the discretion of the President, or so much thereof as might be found necessary to the purpose indicated. The memorial was at once prepared, signed by all the members of the Board, and forwarded to the President. Similar action was taken by other State Boards of Health and prominent sanitary organizations in this country. The fund was, however, placed at the disposal of the U. S. Marine Hospital Service. The States of the West and Northwest were thus left without protection from the importation of communicable diseases by immigrants, unless they should by State or municipal action enforce a local inspection-service.

While such State or municipal action might be legal and practicable there seems to be no practicable way for an equitable distribution of the expense. Certainly it does not belong to the cities of Port Huron and Detroit to bear the expense. It has been held by the supreme court of the U. S. unconstitutional for a State to impose a tax on immigrants, even for the purpose of maintaining an inspection to keep out contagious diseases. See *People vs. Compagnie Generale Transatlantique*, 107 U. S., 59; *Henderson vs. Mayor of New York*, 92 U. S., 259; *Chy Lung vs. Freeman*, 92 U. S., 275; see also *Passenger Cases*, 7 How., 283, and *People ex rel. Bunker vs. Pacific Mail Steamship Co.*, U. S. Circuit Court, D. California (Apr., 1883), Fed. Reporter, June 19, 1883, vol. 19, p. 34. As the inspections at Port Huron and Detroit are for the benefit of the whole Northwest, no less or even more than for the people of Michigan, it is not just for Michigan to bear the whole expense. Adequate protection from the introduction of small-pox and other communicable diseases can be had only by coöperation of national with state and local authorities. The inspection is required at all times, not merely when an epidemic is already in progress as the result of having no inspection. Proper protection, therefore, justifies making the inspection an expense to the whole country; or it might well be paid from the fund created by the per capita tax on immigrants, if such tax were now collected by the general government, at Port Huron. There should be an inspection of emigrants before their departure from a foreign port; and all not found protected against small-pox should be vaccinated when they embark to cross the ocean. Some steamship lines require this. And one result of the inspections carried on in this country for the year ending May 31, 1883, seemed to be a greater care on the part of certain steamship lines to have their passengers vaccinated. Emigrants themselves, too, learning from friends in this country that an inspection was in force, and what it required, had themselves vaccinated before their departure, to save themselves trouble on the way.

The inspections were continued at Detroit till December 15, 1882; at Port Huron, till May 31, 1883.

The inspectors at Port Huron were at first Hiram R. Mills, M. D., supervising sanitary inspector, and C. E. Spencer, M. D., and C. B. Stockwell, M. D., inspectors; in October, Drs. Mills and Spencer; from November 1 till December 15, Drs. Mills, Spencer, and Stockwell; and from December 15, 1882, to May 31, 1883, Dr. Mills alone.

At Detroit they were J. J. Mulheron, M. D., and Rudolph C. Teschan, M. D., till October 1; Dr. Mulheron in October; and Dr. Mulheron and Dr. F. W. Owen from November 1 till December 15, Dr. Teschan having moved out of the State.

EXHIBIT 6.—*Stating by Weeks from Oct. 1, 1882, to May 31, 1883; also for the Year ending May 31, the Number of Trains* and Immigrants Inspected at Port Huron, Mich., the number of Immigrants passed as protected by old vaccinations or by having had small-pox, the number of recent vaccinations found working, the number not working, the number of vaccinations performed by the inspectors, the number of passes examined, revoked, issued, and withheld, and the number of persons sick on trains.*

WEEKS ENDING SATUR- DAY,—	Trains inspected.*	Immigrants inspected,†					Passed, Protected by		Vaccinations performed by inspectors. ‡					Passes. ||				Persons sick on trains.	Cases of measles on trains.
		Immigrants inspected,†	Old vaccination,† and passed.	Having had small- pox.	Recent vaccination found working.	Total passed as pro- tected.	Recent vaccinations found not working.	Primary, 5 years old and over.	Primary, under 5 years old.	Revaccinated.	Total vaccinations performed.	Examined, and hold- ers found protected.	Revoked hold- ers not protected.	Issued.	Withheld. ¶				
October 7...	34	1169	226	56	21	303	58	28	450	536	51	134	845	324	6	—	—		
October 14...	14	1013	156	52	5	213	48	26	356	432	—	1	644	365	—	—	—		
October 21...	36	1415	206	42	44	292	43	23	734	800	107	321	1097	318	5	0	0		
October 28...	39	1318	173	58	31	262	55	32	639	726	109	324	988	330	0	0	0		
Nov. 4...	33	951	166	73	16	255	61	63	432	556	7	19	813	138	2	0	0		
Nov. 11...	34	1038	193	88	4	285	108	43	549	700	22	109	989	49	6	—	—		
Nov. 18...	35	1176	164	58	6	228	58	20	683	761	100	347	989	184	3	0	0		
Nov. 25...	33	684	80	128	1	209	64	35	369	468	9	44	682	2	5	0	0		
Dec. 2...	31	549	71	80	4	155	75	29	252	356	4	3	511	38	0	0	0		
Dec. 9...	31	755	127	95	3	225	50	18	449	517	68	258	747	8	—	—	—		
Dec. 16...	32	442	101	51	10	162	52	21	181	254	44	15	440	2	—	—	—		
Dec. 23...	31	414	72	29	15	116	39	22	237	298	22	39	414	—	—	—	—		
Dec. 30...	24	255	21	36	—	57	9	14	82	105	5	12	162	92	1	0	0		
Jan. 6...	24	200	16	30	—	46	10	3	65	78	—	—	124	76	0	0	0		
Jan. 13...	24	286	15	65	1	81	16	14	92	122	1	16	203	83	0	0	0		
Jan. 20...	24	298	33	18	—	51	21	14	85	120	—	—	171	95	2	0	0		
Jan. 27...	24	251	22	31	—	53	14	—	76	90	3	2	143	108	5	3	0		
Feb. 3...	24	301	26	26	3	55	16	4	80	100	23	24	155	146	4	—	—		
Feb. 10...	21	298	49	14	—	63	9	4	69	82	12	5	145	153	0	0	0		
Feb. 17...	24	293	42	33	—	75	10	14	78	102	—	—	177	113	3	1	0		
Feb. 24...	24	307	45	15	3	63	16	10	100	126	—	—	189	118	0	0	0		
March 3...	24	425	40	21	—	61	6	2	93	101	—	9	162	263	0	0	0		
March 10...	20	534	104	25	4	133	19	5	89	113	70	38	246	288	1	0	0		
March 17...	28	664	145	17	8	170	16	7	291	314	104	189	484	180	0	0	0		
March 24...	27	876	56	12	8	76	14	11	152	177	46	106	253	623	2	—	—		
March 31...	27	1248	325	66	18	409	25	30	441	496	—	—	905	343	2	0	0		
April 7...	22	1260	239	47	17	303	35	16	268	319	—	—	622	638	6	—	—		
April 14...	26	1513	116	70	12	198	49	24	264	337	5	24	535	978	1	1	0		
April 21...	30	2068	767	79	4	850	34	13	455	502	496	42	1352	676	6	4	0		
April 28...	28	1955	173	79	8	260	27	16	517	560	19	22	820	1135	0	0	0		
May 5...	31	2357	343	70	11	424	17	21	454	492	—	—	916	1441	0	0	0		
May 12...	36	3255	387	14	—	401	3	—	289	292	—	—	693	2562	1	0	0		
May 19...	28	1880	81	2	55	138	11	3	138	152	—	—	290	1590	0	0	0		
May 26...	34	2181	202	14	41	257	4	7	403	414	—	—	671	1510	0	0	0		
May 31...	22	1193	57	—	13	70	—	—	187	190	—	—	260	933	0	0	0		
Totals:—																			
35 wks, Oct. 1 to May 31.	979	34792	5039	1594	306	6980	25	1092	505	10101	11788	1327	2103	18837	15902	65	9	—	
18 weeks, June 1 to Sept. 30.	741	17909	4736	460	261	5457	144	474	592	6926	8023	3164	1887	12040	1516	130	54	—	
Year ending May 31.	1720	52701	9775	2054	627	12456	169	1566	1187	17027	19811	4491	3990	30877	17418	195	63	—	

* Includes one boat, propeller Badger State, inspected Nov. 2.

† For want of help or time, in some cases because both the inspector and his assistant were engaged on other trains, immigrants are believed to have passed without inspection as follows: Weeks ending Oct. 7, two carloads probably about 70; Oct. 14, about 100; Nov. 18, one train not thoroughly inspected, on account of misunderstanding as to time of its arrival.

‡ In most cases after July 1, 1882, the vaccinations considered protective had been performed within five years.

§ In most cases the evidences of recent vaccinations not successful disappear before the immigrants reach Port Huron. The recent vaccinations inspected had nearly all been performed on board steamers arriving at New York.

|| Cards certifying the holders to be vaccinated or otherwise protected from small-pox.

¶ Among the causes for withholding passes were want of time or help in making the inspections, irregularity of trains, time of arrival not being received in time, several trains arriving at once, failure of trains to connect, etc. In a few cases immigrants refuse to be vaccinated. After the reduction of the force Oct. 1 and Dec. 15, the number of passes withheld was necessarily greater. In many cases in which passes were withheld, the immigrants were inspected only as to the presence of contagium.

[Foot notes to Exhibit 6 continued at bottom of page 37.]

EXHIBIT 7.—*Stating by weeks from Oct. 1 to Dec. 15, 1882, also by a total for the 29 weeks from June 1 to Dec. 15, the number of boats and trains and of immigrants inspected at Detroit, Mich., the number of immigrants found protected by old vaccinations or by having had small-pox, the number of recent vaccinations found working, the number not working, the number of vaccinations performed, the number of passes examined and issued, and the number of persons found sick in transit.*

WEEKS ENDING SATURDAY.	Boats and trains inspected.	Immigrants inspected.	Immigrants inspected who had				Vaccinations performed by inspectors.					Passes. *			
			Old vaccinations and were passed.	Previously had small-pox.	Recent vaccinations working.	Recent vaccinations not working.	Primary.	Secondary.	Under five years.	Over five years.	Total. †	Endorsed.	Issued.	Sick in transit.	Cases of measles.
October 7.....	6	602	564	10	56	27	27	12	21	18	39	560	42	---	---
October 14 †.....	8	779	373	11	31	40	15	4	13	6	19	370	25	---	---
October 21 †.....	13	668	516	15	61	69	11	8	11	8	19	513	19	---	---
October 28.....	7	907	875	20	93	35	16	2	12	3	18	879	31	---	---
November 4.....	9	984	969	12	65	58	5	7	5	7	12	972	12	2	---
November 11....	11	1451	1417	30	65	105	15	132	15	132	147	1311	140	3	3
November 18....	8	683	666	12	23	49	17	58	17	58	75	608	75	---	---
November 25....	8	682	672	15	32	38	5	54	5	54	59	623	59	---	---
December 2 §....	7	331	330	11	27	15	1	27	1	27	28	303	28	2	2
December 9.....	7	749	732	25	46	36	17	73	17	73	90	659	90	---	---
December 16 ||...	7	198	196	10	14	11	2	19	2	19	21	177	21	1	---
Totals:—															
11 wks., Oct. 1 } to Dec. 16.....	††91	8034	7310	171	513	483	131	396	119	405	527	6975	542	8	5
18 wks., June 1 } to Sept. 30.....	244	22001	10342	265	806	682	156	363	112	401	**535	10993	1671	48	31
29 wks., June 1 } to Dec. 16.....	335	30935	17652	436	1319	1165	281	759	231	806	**1062	17968	2213	56	36

* Cards certifying the holders to be vaccinated or otherwise protected from small-pox.

† Load of 384 immigrants arrived at 7:40 A. M. by G. W. Ry. was not reported long enough in advance to permit the inspector to meet the train at a sufficient distance from Detroit to do more than inspect; he had no time for statistics.

‡ Train with 133 immigrants, a special by the C. S. Ry., arrived in Detroit at 7:40 A. M., Oct. 18, was reported at same time as one by G. W. Ry., thus giving only time for inspection, but not for statistics.

§ Car No. 56 on train arrived at 9:45 A. M. by G. W. R. R., inspected Nov. 26, was in a very unsanitary condition; it had not been scrubbed for three months.

|| Fractional week, ending Thursday. A number of immigrants inspected Dec. 7 presented vaccination cards from S. S. Thingvalla, Thingvalla line, which were not signed by the ship surgeon. The cards were taken up, revaccinations performed, and new cards issued.

† Vaccinations not classified previously to July.

** Includes 22 vaccinations not classified.

†† Includes two boats.

Exhibit 6, page 36, contains a tabular statement relative to inspections at Port Huron, from October 1 to May 31, and a summary for the year ending May 31, 1883. Exhibit 7, above, contains a statement for Detroit, from October 1 to December 16, and a summary for the 29 weeks from June 1 to December 16, 1882. Exhibit 8, page 38, combines the summaries for Detroit and Port Huron. These exhibits have been compiled from reports made

a Dead on train, one; cause not learned.

b Two children sick on steamer, one died during night.

c Thirteen Portuguese inspected Tuesday had all had small-pox.

d Fractional week, ending Thursday.

e Includes 31 primary vaccinations, ages not known.

f Most of the primary vaccinations are of Canadian immigrants.

EXHIBIT 8.—*Stating for the year ending May 31, 1883, at Port Huron, and for the 29 weeks ending Dec. 16, 1882, at Detroit, the number of trains and of immigrants inspected, the number of immigrants passed as protected by old vaccinations or by having had small-pox, the number of recent vaccinations found working, the number not working, the number of passes examined and issued, and the number of persons found sick in transit.*

PLACE OF INSPECTION.	Trains and boats inspected.	Immigrants inspected	Immigrants inspected who—						Vaccinations made by inspectors.			Passes, †		Persons sick on train or boat. §	Cases of measles.	Cases of whooping-cough.
			Had old vaccinations and were passed.		Had had small-pox.		Had recent vaccination.		Primary	Secondary.	Total.	Examined, and holders found protected.	Issued.			
			Number.	Per cent of all Inspected.	Number.	Per cent of all Inspected.	Working.	Not working.								
Port Huron*	*1720	52701	9775	†19	2054	†4	627	†169	2784	17027	19811	4491	30877	195	63	4
Detroit †...	†635	30935	17652	57	436	2	1319	†1165	281	759	†1062	17968	2213	56	36	3
Total.....	2055	83636	27427	†33	2490	†3	1946	1334	3065	17786	20873	22459	33090	251	99	7

* For the year ending May 31, 1883. † For the 29 weeks ending Dec. 16, 1882.

‡ Cards certifying the holders to be vaccinated or otherwise protected from small-pox.

§ Includes one boat. † Includes 39 boats.

• Includes 22 vaccinations not classified.

† In most cases evidence of recent unsuccessful vaccination disappears before the immigrant reaches Port Huron.

• Many recent vaccinations examined at Detroit are too recent for the inspector to determine whether they are successful.

† Assuming that none of the 17,418 immigrants to whom passes were not given at Port Huron were examined as to their protection by old vaccinations or by having had small-pox (though many of them were thus examined), at Port Huron the per cent (of all examined in this respect) found protected by old vaccinations would be 28, and the per cent protected by having had small-pox would be 6; at both places the per cent protected by old vaccinations would be 41, and the per cent protected by having had small-pox would be 4.

§ Not including four found dead on trains.

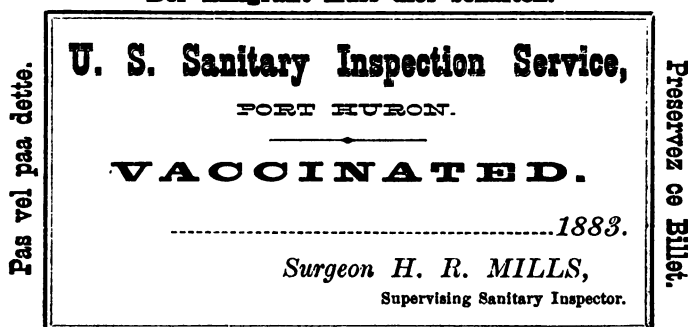
weekly, in duplicate, to the National Board and to the Michigan State Board of Health. 1,719 trains and one boat were inspected at Port Huron, 296 trains and 39 boats at Detroit, a total of 2,055 trains and boats at both places.

At Port Huron 52,701 immigrants were inspected as to presence of contagium, over 35,000 of them being inspected as to their protection by previous vaccinations or by having had small pox. Only about 25 per cent of those examined as to protection were found protected by old vaccinations; and only about 6 per cent, by having had small-pox. At Detroit 30,935 immigrants were inspected, of whom about 57 per cent were found protected by old vaccinations, and about 2 per cent by having had small-pox. Of those inspected as to protection, at both places, about 41 per cent only were protected by old vaccinations, and about 4 per cent by having had small-pox. At Port Huron 627 recent vaccinations were found working, and 169 not working; at Detroit 1,319 were found working, and 1,165 not working. The inspector at Port Huron notes that evidences of recent unsuccessful vaccinations disappear in most cases before the immigrants reach Port Huron. The inspector at Detroit notes that many recent vaccinations examined are too recent for him to determine whether they are successful.

Vaccinations were performed by the inspectors, as follows: At Port Huron, 2,784 primary and 17,027 secondary, total 19,811; at Detroit, 281 primary, 759 secondary, total 1,062, including 22 not classified; at both places, 3,065 primary, 17,786 secondary, total 20,873. It must be remembered that the inspections were in force at Port Huron one year, but at Detroit less than seven months.

Passes (cards certifying the holders to be protected by vaccination or by having had small-pox) were examined and holders found protected as follows: At Port Huron 4,491, at Detroit 17,968, total 22,459. At Port Huron 3,990 passes were revoked, or taken up, the holders not being found really protected. The number taken up at Detroit has not been reported. At Port Huron 30,877 passes were issued, at Detroit 2,213, total 33,090. The following shows one form of passes issued at Port Huron. Another card, of a different color, has in place of the word "VACCINATED," "PROTECTED, By Previous Vaccination or Previous Small-pox;" and another of yet different color, has in place of "VACCINATED," "NOT VACCINATED, on account of

Der Emigrant muss dies behalten.



PRESERVE THIS TICKET to prevent detention in Quarantine.

At Port Huron 195 persons were found sick on train or boat (to whom medical services were rendered when needed), at Detroit 56, total 251. 63 cases of measles and 4 of whooping-cough were found at Port Huron, 36 of measles and 3 of whooping-cough at Detroit; total, 99 cases of measles and 7 cases of whooping-cough. In a preliminary inspection at Port Huron during the last days of May, 1882, two cases of small-pox were found.

That more cases of small-pox were not found by the inspectors does not indicate that the inspections were not needed. Before the inspections began small-pox and other contagious diseases were known to be introduced. The fact that inspections were enforced doubtless was a check on the forwarding of persons sick with small-pox.

The epidemic of small-pox prevailing in Europe when the inspections began subsided somewhat, and the danger of importation of that disease became less than it had been. It is to be hoped that before the outbreak of another epidemic the inspections may again be in force. The only real safety is in maintaining the inspections constantly.

The following is a copy of the general instructions by the National Board, under which the inspections were made. As the force of inspectors was reduced, the inspectors in Michigan were instructed to omit vaccinations, rather than inspections for the presence of contagious diseases.

INSTRUCTIONS TO INSPECTORS OF IMMIGRANTS.

Immediately upon the arrival or interception of any emigrant passenger train at your station you will take note of the number of such cars, record of train, and number of passengers, which you will obtain from the conductor, and you will immediately examine the passengers in the cars which are to be sent on—in case the train is broken—before the main portion of the train moves.

Proceed regularly through the cars, examining each passenger, requesting to be shown the pro-

tection-card issued at last station, and upon which you will indorse your initials, date of examination, and station, until further advised.

(B.) Upon discovery of evidence of small-pox upon any passenger, in any car, or at any station, the conductor is to be informed, and with his aid the patient should be isolated in the quarantine car, and carried to the next proper refuge-station as shall be or is already agreed upon with the local sanitary authorities. The passengers and materials in such car from which the patient has been removed shall be subjected to sanitary cleansing and disinfection.

You will report the facts in the case to local as well as to the State Board within twelve hours.

(C.) All persons found exposed to small-pox contagion in any car, or at any station, shall be offered free vaccination.

(E.) In any instance of small-pox discovered on car or among emigrants, its source should be sought for, if practicable, and measures immediately taken to prevent further spread of the disease. In case the source is determined you will inform the secretary of the State Board concerning the essential facts ascertained.

You will particularly notice and make any required record of the condition and results of vaccinations which were made after the arrival of emigrants at the port of destination.

In every case of failure of such vaccination you should immediately proceed to re-vaccinate, following the same directions as in "C."

These preliminary instructions will be subject to revision, and you are requested to communicate to the National Board of Health, through the State or Local Board of Health, any defects in the system which, in your opinion, should be remedied, and such other suggestions occurring to you which will render the service efficient.

These inspections and vaccinations should be conducted while the train is in motion, or at the station, according as it may be most convenient, so as to cause the least detention to the movement of the train.

You are directed to carry out any additional regulations made by State or local sanitary authorities, provided such regulations are not in conflict with these general instructions.

The following is a portion of the report of the inspection-service in Michigan, made at the close of the year to the National Board and in duplicate to the Michigan Board of Health, by H. R. Mills, M. D., Supervising Sanitary Inspector:—

To the President of the National Board of Health, Washington, D. C.:

SIR:—I have the honor to forward herewith the consolidated report* of the immigrant-inspection service in Michigan for the year ending May 31, 1883.

To review briefly the history of this service, I beg leave to state that in consequence of the settled conviction among medical men and sanitarians that preventable contagious diseases, and especially small-pox, were being imported and spread by the agency of immigrants, and on account of the epidemic then prevailing extensively in Chicago and the Northwest, a convention of health officers and leading sanitarians from a large number of the States of the Union was held in Chicago in the latter part of June, 1881. After a thorough and careful investigation of the subject it was decided that the sanitary inspection of immigrants was an absolute necessity, and that the National Board of Health was the proper body to take charge of the work. After much seemingly unavoidable delay another convention of health officers and sanitarians was held in Port Huron in May, 1882, at which it was decided, at the urgent request of the State Board of Health, to begin the inspection at once; and Dr. Stephen Smith, of the National Board, who was present, proceeded to appoint inspectors and organize the force necessary. Two stations were ordered in Michigan, one at Port Huron and one at Detroit, and placed under the supervision of the State Board of Health.

INSPECTION SERVICE AT PORT HURON.

On the 15th of May, 1882, I was placed on duty by Dr. H. B. Baker, Secretary of the State Board of Health of Michigan, with instructions to make such observations, and gather such facts and items of information, and make such arrangements as were essential to the beginning of regular train inspection on the first day of June.

During this preliminary work I found two cases of small-pox on immigrant trains, one on the 27th of May on a train from Quebec, and another on the 29th day of May on a train from New York. In both instances the stage of the disease indicated that the eruption must have been observable before their departure from the ports of debarkation, and that close scrutiny should have prevented the diseased persons from being taken on the trains.

There are practically three lines of railway coming into Port Huron from the east, viz.: The main line of the Grand Trunk from Quebec and Portland; the Buffalo branch, which joins the main line at Stratford, Ontario, and the Great Western Division of the Grand Trunk, which was

*[The *Tabular Report* referred to by Dr. Mills is omitted here, because substantially covered by Exhibits 6, 7, and 8, pages 36, 37, and 38.]

formerly the Great Western Railway, from Niagara Falls. The first two of these roads bring the greater portion of the immigrants coming into the country via Port Huron. It was found on investigation that immigrants came on the regular as well as special trains, and hence it was necessary that *all* trains, both regular and special, should be inspected, in order that the work should be thoroughly done. Hence it became necessary to have inspectors on duty often from four o'clock and regularly at five o'clock in the morning until the last train arrived at night, usually at eight o'clock, but often much later.

On the first day of June Drs. C. E. Spencer and C. B. Stockwell were placed on duty under my supervision, and the regular train inspection began. Owing, however, to unforeseen delay in the receipt of virus, vaccination was not begun until June 10. During the month of June all persons having large typical scars, and those having had small-pox, were passed as protected, but since the first day of July the rule has been to vaccinate all immigrants arriving in second and third class cars who have not had small-pox, or who have not been satisfactorily vaccinated within five years.

When large special trains approach this station we have been informed in advance by telegraph and inspectors have gone down the road and met them, when there was opportunity. Otherwise the inspection has been made while crossing the river and vaccination has been performed after arrival on the American side. When possible a thorough inspection of each individual has been made, regardless of the protection cards they may hold. When a person has been found properly protected by old vaccination, previous small-pox, or recent vaccination working, a white *Protection* card has been issued. If not found protected, vaccination has been performed, unless sickness existed or some other good reason why the individual should not be vaccinated, such as old age, feeble condition, pregnancy, or some other contra-indicating physical condition, and a red *vaccination* card has been issued. No one has been allowed to escape without a good reason. While we do not resort to compulsory vaccination, the arguments which are brought to bear on the passenger are generally sufficient. At present the inspection seems to be expected by those crossing here, and I judge from this that word has been sent back by former immigrants as to the regulations, and they come with their minds prepared.

During the season of navigation, immigrants arriving at this port are divided into three classes: The first, Canadian; the second, foreign, via Quebec; the third, foreign, via New York. The first comes by the main line of the Grand Trunk Railway from the provinces of Ontario, Quebec, Nova Scotia, New Brunswick, and the neighboring territory about the mouth of the St. Lawrence. There are some peculiarities about this class worthy of note. It consists largely of the French element, and among them we see the evidence of the prevalence of small-pox in the numerous pock-marked faces which come to our notice. And again in this same class, and especially among the people from Cape Breton and Prince Edward's Island, we find a large number of unvaccinated adults. In fact, there prevails throughout the region from which this class comes a prejudice against vaccination. This was an obstacle which at first threatened to be a serious one, but which does not now seriously interfere with the work of vaccination.

While this prejudice against vaccination prevails I am told by those familiar with their ways that they not unfrequently seek opportunities for exposing themselves and their children to the contagion of small-pox. This class is distributed through the lumber woods of Michigan and the Northwest. It comes into the country without undergoing any inspection or quarantine whatever until they reach the United States.

The second class comes principally from the north of Europe, and debarks at Point Levi, near Quebec, and also reaches this port via the main line of the Grand Trunk Railway. The Scandinavians predominate. I am told that a form of inspection is maintained by the authorities at Quebec, but no vaccination is practised either on the lines of steamers running to this point, or on their arrival at that port.

After the close of the season of navigation immigrants instead of coming to Quebec are landed at Halifax, Portland, Boston, or ports of entry farther south.

The third class comes mostly from Norway, Germany, and the south of Europe, and lands at Castle Garden, New York. The system of vaccination on board ships bringing immigrants to New York has been carried out more or less faithfully during the year, but in many instances there has been gross neglect. When this class is re-inspected at this port it is found that a large per cent are unprotected and require vaccination.

In numerous instances individuals are found with protection cards in their possession who do not reveal the slightest sign of any vaccination whatever, and so far as I can learn the rule for re-vaccination if not vaccinated within five years is not acted upon.

Owing to the reduction of the number of inspectors at this station on and after December 15, to one only—on account of the near exhaustion of the funds at the disposal of the National Board—the work was very much crippled, and many immigrants passed into the country without having undergone a proper inspection.

THE INSPECTION SERVICE AT DETROIT.

While it is known that comparatively few immigrants make Detroit their port of entry, still it is also known that a large number pass through that city on their way westward from New York and other eastern ports. Hence it also became necessary to establish the inspection service at that point, and, in accordance with the orders of Dr. Stephen Smith, Drs. J. J. Mulheron and R. C. Teschan were appointed inspectors of the National Board of Health, to act under the supervision of the secretary of the State Board.

Immigrants arriving at Detroit are similar in character to the third class of those arriving at Port Huron. They land at New York and reach Detroit on their way west by the Canada Southern or the Great Western Division of the Grand Trunk railway. They come largely from Norway, Sweden, and Germany, and are scattered throughout the West and Northwest.

On the 15th of December, for the same reason that the force was reduced at Port Huron, the inspection was closed entirely at Detroit.

AT PORT HURON AND DETROIT.

Eighty-three thousand six hundred and thirty-six immigrants passed under the observation of the inspectors at Port Huron and Detroit during the year; the nationality being designated in order of the highest to lowest in point of numbers beginning with the Canadians and ending with the Icelanders, as follows: At Port Huron—1. Canadians, 2. Scandinavians, 3. Germans, 4. Foreign English, 5. Italians, 6. Russians, 7. Poles, 8. Hollanders, 9. Irish, 10. Portuguese, 11. Icelanders; and at Detroit—1. Germans, 2. Scandinavians, 3. Foreign English, 4. Italians, 5. Poles, 6. Icelanders. Nearly all were destined to the Northwest *via* Chicago. Of these, 26,240 were passed by the inspectors on account of previous vaccinations, 2,482 on account of having had small-pox, and 1,813 on account of recent vaccinations working at the time of inspection, performed almost entirely on board the steamers arriving at New York.

In estimating the per cent of those found unprotected and requiring vaccination, it must be remembered that 30,900 were inspected as to the presence of contagion only, without reference to susceptibility to the contagion of small-pox. This occurred on account of the want of a sufficient force of inspectors at times when two or more heavy trains arrived at or about the same hour. Hence 52,736 must be the basis of this per cent. The table shows that 3,065 primary vaccinations were performed, largely among adults, 17,786 re-vaccinations, and 22 vaccinations not classified, making a total of 20,873 vaccinations of unprotected persons out of 52,736, being nearly 40 per cent. And we have no reason to believe that the 30,900 who were inspected only as to presence of contagion were any better protected than those who were more thoroughly examined. We therefore conclude that about 12,300 people who were unprotected and dangerous to the public health, came into the country to become food for contagion on exposure, who should have been rendered secure against attack themselves and harmless to others.

A number of dead children were discovered on the trains; and 261 immigrants who were sick or disabled were found and cared for by the inspectors of the National Board. The causes of sickness were, among children, teething, diarrhoea, whooping-cough, measles, and other diseases of childhood, and injuries; among adults, pneumonia, continued fever, measles, and injuries. The sanitary condition of the cars was for the most part poor; that of the passengers, in the main, fair.

After the experience of one year the utility of the inspection-service is easily to be seen. Since its commencement valuable statistics have been gathered, and the importation of disease has been greatly diminished; the mere fact of the existence of the inspection becoming a safeguard.

This inspection not only furnishes an efficient means of warding off contagion, but an opportunity for establishing a thorough system of vaccination, and thus in a double way protects public health. As has before been said, these people arrive at our ports of entry, many of them with a strong prejudice against vaccination, and if allowed to come into the country unvaccinated the opportunity will be lost, and in all probability will never occur again, for subjecting them to such control as can be exercised by the inspectors of the National Board of Health. But vaccination controls but one disease, one item in the list, small-pox. The protection of the country against the importation of any disease dangerous to public health is certainly a matter of great importance, and as all the States and Territories are equally interested, it would seem proper that this common foreign foe should be fought at the expense of the general government. This importation is accomplished not only through the medium of diseased persons, but by infected articles of clothing or merchandise. Large quantities of rags are brought into this country every year from Europe and the provinces of Asia and Africa bordering on the Mediterranean. It is impossible to ascertain the number of deaths which annually occur in this country from diseases, the germs of which are imported in this manner. The inspection and disinfection or destruction of all suspected articles collected from the East should be rigidly enforced.

In view of the experience of the past year, by which we know that the inspection can be carried on and a vast amount of sanitary work accomplished without serious inconvenience to the traveling public, and that it will meet with a hearty cooperation of the railroad authorities; and in view of the threatenings that come from one direction and another of yellow fever, cholera, and small-

pox, which forbode evil for the coming year, it becomes serious neglect on the part of the authorities whose duty it is to provide protection, not to maintain any efficient barriers, in which the sanitarians of the country have confidence.

Very Respectfully,

H. R. MILLS, M. D.,

Supervising Sanitary Inspector, N. B. H.

A case in which small-pox seems to have been introduced into this State by immigrants, before the inspection began, is reported by Dr. Marshall, health officer of Lansing, as follows. This case also well illustrates the protective power of vaccination. It will be noticed that in the two vaccinated families most exposed the only persons who had small-pox were two children who had not been vaccinated, and a child in whom the vaccination did not work:

DR. H. B. BAKER, *Secretary State Board of Health:*

DEAR SIR:—The origin of the small-pox case which was reported from North Lansing last summer seems to have been about as follows:

A family of emigrants arrived in this city from Germany April 15, 1882. They came across the ocean in the steamship Cambria, and landed in New York April 12. There was a case of small-pox on ship-board, which was taken to the small-pox hospital in New York when they arrived. The whole family were vaccinated before they left that city.

Three days after their arrival in Lansing a child was born to them. This child was soon taken sick with an eruptive disease. The eruption dried into scabs and came off. No physician was called, and the nature of the disease was unknown to the family. May 30 a child of a neighbor who had visited this family was taken sick with an eruptive disease, which was soon followed by a second child with a similar disease; the eruption drying into scabs which fell off, leaving pits and red spots. These spots were still red four months after recovery, when I examined them.

This last family had been in this country a year or more. The first child in this family who had the disease was an infant six months old when they came to this country. The whole family were vaccinated on ship-board except the baby, which was thought too young. Vaccination did not work on the next older child. These two children were the only ones in this family who had the disease.

A young man by the name of Adam Nussler visited these families when they were sick, and he was reported to the board of health sick with small-pox July 11. It was thought at the time that he contracted the disease in Grand Rapids, which was probably a mistake.

Taking it for granted that the new-born child in the emigrant family had small-pox, it would be easy to account for the other cases.

Lansing, Dec. 4, 1882.

O. MARSHALL.

R. J. Farquharson, M. D., Secretary of the Iowa State Board of Health, reports the following case in which small-pox may have been introduced into that State by immigrants, before the immigrant-inspection began:

IOWA STATE BOARD OF HEALTH, }
OFFICE OF THE SECRETARY, }
Des Moines, Oct. 31, 1882. }

DR. HENRY B. BAKER, *Secretary Michigan State Board of Health, Lansing, Michigan:*

DEAR DOCTOR:—I am just now in the receipt of information which goes far to show the wisdom of your idea, that for the prevention of the dissemination of small-pox by railroads, something more is required than the inspection and vaccination of the passengers.

Last March a farmer, aged 50 years, left his home in Elkhart township, in this (Polk) county, and after a ride of six miles in his wagon took the cars on the Chicago, Rock Island & Pacific Railroad at Albion, and came to this city, a distance of ten (10) miles.

Here he passed the night in a private family; there being no small-pox in the city at the time, nor for a considerable period previously. The next day he returned home by the same route. After the usual period he broke out with small-pox, modified by vaccination; and from him his son and the hired girl had small-pox, being both unvaccinated. Now on its main line, to Council Bluffs via Des Moines, the Chicago, Rock Island & Pacific Railroad does not run immigrant trains, but the immigrants are mixed up with the other passengers. So that it appears altogether probable that this man contracted small-pox from an exposure in an infected car for a space of time, not over twenty minutes.

Yours truly,

R. J. FARQUHARSON, *Secretary.*

The baggage and, so far as possible, the clothing of immigrants coming from localities where small-pox or any other dangerous contagious disease is known to exist, and of those exposed to such diseases on the journey, should be carefully disinfected. This point seems not to have received the attention it

deserves. It is not enough that the immigrant should be protected against small-pox by vaccination. He should be prevented from conveying the contagium of the disease to others. If he has been exposed to small-pox at the port of departure or entry, or on board ship, even though himself protected by vaccination or previous attack, only a thorough disinfection of his clothing and baggage can with certainty guard against his communicating the disease to others, and render him a clean desirable immigrant. In the case reported by Dr. Marshall (page 43) it is probable that the infant who first was taken sick at North Lansing was infected by the clothing of the family. In such cases as that reported by Dr. Farquharson (page 43), where immigrants travel in first-class cars, other passengers would be especially liable to infection by their clothing or baggage, though the immigrants themselves might be well protected by vaccination or previous sickness from small-pox.

HENRY B. BAKER.

PRESENT KNOWLEDGE RESPECTING DIPHTHERIA.

BY A COMMITTEE OF THE STATE BOARD OF HEALTH.

GENTLEMEN:—Your committee appointed some months since, to prepare a paper setting forth what is at present known concerning diphtheria, respectfully submit herewith their report. In the preparation of this paper we have met with numerous obstacles of a character by no means insignificant, chief among which is the great diversity of opinion respecting the nature of this grave malady. Probably no one disease has been subject to more extensive, and pains-taking investigations than this, and yet, notwithstanding the fact that many of the investigators have been men of the highest qualifications for their work, the results have, in numerous instances, been so divergent in character that the conclusions of none of them have as yet received unanimous approval and acceptance by the profession.

At the time this subject was placed in our hands, a series of interesting investigations was being carried on by Drs. Wood and Formad, of Philadelphia, which promised more definite results than had previously been attained by other investigators. Although the experiments were completed some time ago, the results are not yet wholly made public, owing to a necessary delay in their publication by the National Board of Health. We have delayed the presentation of this report until the present time in order to be able to make use of the results of the investigations referred to, which we are now able to do, through the kindness of the secretary of the National Board of Health, in providing us with proof sheets of the complete report of Drs. Wood and Formad, which is still in the printer's hands.

We have sought to obtain information from all reliable sources, the chief of which, aside from the special report just referred to, are the following:

1. The leading monographs on the subject which have appeared during the last ten years, among which special mention should be made of the admirable treatises by Dr. Morrell McKenzie of London, and Prof. A. Jacobi of New York, and the exhaustive article by Oertel in Ziemssen's Cyclopaedia of Medicine.

2. Numerous articles by reliable observers in current medical literature.

3. The replies to a series of thirty-seven questions, copies of which were sent to several hundred physicians in various parts of the United States.

The information derived from these various sources we have endeavored to summarize as concisely as possible, necessarily omitting much which might have been of interest, in order to bring the size of this paper within reasonable bounds. Your committee has made no original researches bearing on this subject, and has no original views to present. The report is presented simply as a compilation of such facts pertaining to the subject as have been accessible to them, and which seem to be the most thoroughly confirmed by experimental researches and actual observation.

In respect to the replies to the circular referred to it should be stated that the questions asked were purposely so framed as to require the expression of something more than simple opinions, and the committee were not at all disappointed at finding so small a proportion of the questions answered in full by our correspondents. It is hoped, however, that the plan adopted, while it largely curtailed the number of replies received, will enhance the value of those which were received sufficiently to more than compensate for the seeming meagreness of the result of this inquiry.

We have endeavored in this report to avoid, so far as possible, the use of technical words and phrases, understanding that one of the primary objects of the paper is to acquaint the public with the character of this destructive malady.

History.—Diphtheria is known to have existed for at least two thousand years, although there have been periods of considerable length since it was first noticed in medical literature, during which time it seems to have disappeared from view. Within the last three centuries, however, it has been apparently increasing in prevalence in all parts of the old world. Scarcely a century has elapsed, however, since its first recognition in America, and it is only within the last fifteen or twenty years that it has come to figure very largely in the mortality reports of this country. At the present time the disease prevails more or less in most of the United States, and in fact throughout nearly the whole civilized world.

The Nature of the Disease.—About fifteen years ago Prof. Oertel and other eminent German investigators professed to have discovered that the essential cause of the disease was certain microscopical vegetable organisms known as *micrococcus*, and *bacterium termo*. They based their conclusions upon numerous experiments and observations which seemed to them conclusive, but which were not entirely sustained by the results of investigations conducted by other equally eminent authorities. Since that time experiments have been made by various investigators in this country and in Europe, for the purpose of settling this question if possible, the latest of which has been already referred to as conducted by Drs. Wood and Formad, of Philadelphia. The following is a summary of their conclusions:

"Micrococci are an essential part of the diphtheritic process, being always found locally at the seat of inflammation, and, when blood poisoning develops, also in the blood, attacking and destroying the white blood corpuscles, forming emboli in the kidney and spleen.

"It is possible to produce in animals by inoculation with membrane, pieces of internal organs, urine, blood, etc., taken from persons suffering from diphtheria, a disease which offers during life the symptoms of diphtheria in man, and after death presents similar lesions, and which is also contagious—capable of reproducing itself; which we therefore consider to be diphtheria. Further, epidemics of diphtheria occur amongst the lower animals, and recorded cases by competent observers show that the diseased animals can produce diphtheria in man.

"The poison of diphtheria is solid and particulate.

"Washing the solid poison does not remove its toxic properties, and the washings are not necessarily poisonous.

"The micrococci isolated in the urine or obtained by culture away from the body are capable of producing a systemic diphtheritic infection in the lower animals, if the local lesions develop of sufficient intensity.

"Endemic and epidemic diphtheria are similar in their nature, but usually epidemic diphtheria is much more contagious than endemic, although endemic cases do occur possessing intense malignancy and contagious power.

"The micrococci of diphtheria do not differ, so far as observed, from the micrococci of furred tongue, etc., except in their tendency to grow in culture fluids.

"The micrococci of furred tongue or ordinary sore throat have a less tendency to grow under culture than have the micrococci of endemic non-malignant diphtheria.

"The micrococci of endemic or non-malignant diphtheria have a much less tendency to grow under culture than have the micrococci of malignant diphtheria.

"The rapidity of growth of the micrococci is in direct proportion to the malignancy of the case yielding them, and its contagiousness.

"On exposure to the air diphtheritic membrane of the most virulent type loses its contagious power, and the micrococci *pari passu* lose their power of growing in culture fluids.

"Under successive generations of artificial culture the diphtheritic micrococci lose their growth, activity, and also their power of infecting the rabbit.

"It has not been experimentally directly proven, but it is a necessary inference from the two facts just stated, that under certain favoring circumstances the sluggish micrococcus puts on growth, activity, and, in all probability, poisonous properties.

"Every grade of case can be found in man from an ordinary sore throat, through simple pseudo-membranous angina and tracheitis, up to malignant diphtheria.

"A case may begin as of sthenic 'pseudo-membranous croup' and end as one of adynamic 'diphtheria' with blood poisoning; and in cases of this character not infrequently no exposure to contagion is discoverable, and there is clinically every reason to believe that the blood poison has been developed within the body of the patient.

"The theory of the disease which we would deduce from these facts is that the micrococcus, which causes the diphtheria, is not a specific organism different from that common to healthy and inflamed throats, but is an active state of that organism; that certain circumstances outside of the human body are capable of throwing this common micrococcus into the condition of active growth and engendering an epidemic of diphtheria. When diphtheria is thus epidemic, the micrococci light upon a throat and, if the throat have little resisting power, as in the child, inflame it or increase a catarrh already existing into a violent inflammation, and also rapidly enter the blood and cause systemic poisoning.

Dr. H. C. Wood believes that the immediate cause of diphtheria is capable of infecting the system, not only by finding entrance through a wound, but also by inflaming a delicate mucous membrane having peculiar susceptibilities and low resistive power and then through the abundance of the exudate causing necrosis of the superficial parts of this membrane and forcing its way through the thus opened lymph spaces.

"Although the diphtheritic attack produced by contagion is caused in this way by a micrococcus from without, diphtheria may also be autogenetic. Thus, on the other hand, a catarrh in a weakly subject may, in the beginning, be simply an inflammation from cold, but the ordinary micrococci in the throat or mouth, favored by the special conditions, etc., may gradually change from the dormant to the active state and by and by act upon the throat, and at last force their way into the system and a self-generated diphtheria be formed out of a 'cold.'"

With reference to the identity of diphtheria and true croup a wide diversity of opinion prevails. Many authors and acute observers of disease hold that true croup is simply a diphtheria localized in the larynx. It is certainly well known that in fatal cases of diphtheria in young infants death usually occurs in consequence of the development of a false membrane in the larynx.

It has been claimed by some observers that the distinction between diphtheria and croup is made by the presence of the micrococcus in the diphtheritic membrane, and the absence of the fungus in the membrane of true croup.

The experiments of Drs. Wood and Formad show, however, that the micrococcus is uniformly present in false membrane appearing in the air passages, whatever may be the exciting cause of the inflammation producing it, although they are sometimes present in much greater numbers than in others. While it can hardly be said to be established that true croup is identical with diphtheria, it is certainly safe to say that a large number of the cases formerly reported as croup, would at the present time be recognized as diphtheritic in character.

With reference to the identity of diphtheria and other diseases, Drs. Wood and Formad make the following observations in their report:

"The facts which have been established in the present research prove that the micrococcus of sloughing wounds, and the so-called phlegmonous erysipelas, agrees in its physical, chemical, and pathological properties with that of diphtheria.

"As we have submitted *Micrococcus septicus* and *M. diphtheriticus* to all known tests, optical, chemical, and vital, and found them always to respond alike, we conclude that the two organisms are specifically one, and that diphtheria is a septic sore throat, or is simply what it was called a century ago, *putrid sore throat, with or without a secondary constitutional septicæmia.*"

Cases of diphtheria appear as *epidemic, endemic, or isolated*. Great differences in the degree of severity are observable in different cases of this disease. The most severe cases are usually to be observable during the prevalence of an epidemic.

For the sake of brevity, we shall defer further remarks concerning the special characteristics of this disease, etc., and proceed at once to an examination of the replies received in answer to the following circular of inquiry:

CIRCULAR OF INQUIRY BY A COMMITTEE CONCERNING DIPHTHERIA.

OFFICE OF THE MICHIGAN STATE BOARD OF HEALTH,
LANSING, MICHIGAN, October, 1882. }

DEAR SIR:—The undersigned, having been appointed a committee of the Michigan State Board of Health to prepare a paper setting forth what is known concerning diphtheria, and wishing to make their data as complete as possible, respectfully invite your attention to the following questions, and ask that if you have made observations on any of the several points to which attention is directed, you have the kindness to put the committee in possession of the facts observed, by answering, at your earliest convenience, such of the following questions as you may be able to answer. Facts, and so far as possible personal observations, constitute the kind of information which is considered the most desirable and useful. Those who have made observations which are not covered by the questions asked below, are also invited to communicate the same to the committee. Please address replies to this circular to John H. Kellogg, M. D., Battle Creek, Michigan. A stamped and addressed envelope for reply is enclosed herewith.

1. Please state facts concerning instances of marked communication of diphtheria by contagion.
2. Have you observed sporadic cases of diphtheria which could not fairly be traced to any source of contagion? If so, please give full details concerning such case, stating, also, what efforts were made to discover a possible origin by contagion; what about visitors from or to other places; trunks, clothing, or other packages or articles received, etc.?
3. Please state in full the sanitary condition of the premises where each such sporadic case occurred.
4. At or shortly before the time you observed the sporadic cases, if you have observed any such, was diphtheria present in the vicinity or in neighboring districts?
5. If so, how were the "sporadic cases" situated with reference to the other cases, as regards direction of prevailing winds, lines of travel, etc.?
6. Have you observed severe and unmistakable cases of diphtheria which were apparently contracted from cases so mild that they were not distinguished from ordinary sore throat or acute follicular pharyngitis? If so, please state in full the facts respecting each case.
7. Have you observed mild cases of diphtheria to give rise to the disease in a severe or malignant form?
8. What were the sanitary conditions (such as water supply, milk supply, exposure to foul air, etc.) where, under your observation, mild cases of diphtheria have given rise to severe cases of the disease?
9. Have you observed any cases of the disease in domestic or other animals?
10. If you have observed the disease in animals, please state how it was communicated to them, whether from human beings or from other animals.

11. Have you observed cases in which the disease was communicated to human beings by domestic or other animals.
12. Please state results of any observations as to the communication of diphtheria by other discharges than the sputum, as the fecal or vesical discharges, or by the breath, or other emanations from the body.
13. Please state all facts within your observation which point to the contamination of the water-supply as a probable means of communicating diphtheria.
14. Please state facts within your observation which point to contaminated water-supply as a probable origin of diphtheria.
15. If you have observed any such facts, please state what was the probable source of contamination of the water.
16. Please state the facts concerning each case observed by you in which diphtheria was communicated by means of milk.
17. What other sources of contagion have you observed, if any? Please state facts concerning each case.
18. How long have you known the contagium of diphtheria to retain its power of infection when confined, as in clothing or bedding, etc., hung in a closet or packed away in a trunk?
19. How long have you known the contagium of diphtheria to retain its power of infection when exposed freely to the action of the air, as in the walls of a house?
20. Have you known diphtheria to reappear, without a new importation of contagious matter, in a house which was supposed to be thoroughly disinfected? If so, state what disinfectants were used and describe carefully the mode of application.
21. Please describe methods of disinfection employed in undoubted cases where the disease did not reappear.
22. Have you observed cases in which the local symptoms of diphtheria were so slight that it could scarcely be distinguished from a common sore throat?
23. What symptoms or physical signs do you regard as characteristic of diphtheria.
24. Have you observed cases in which there was no local expression of the disease in the throat?
25. Have you observed cases in which the nervous symptoms alone were present?
26. What course do you advise in the interests of public safety respecting the management of a case of suspected diphtheria,—when you are in doubt whether it be a genuine case of diphtheria?
27. Please give facts as to relapses, particularly relating to cases in which the relapse was a considerable time after apparent convalescence or recovery.
28. Have you ever observed the occurrence of undoubted diphtheria a second time in the same person?
29. If so, please state the length of time which elapsed between the attacks.
30. Please state all facts under your observation relative to the occurrence of diphtheria a second time in the same person.
31. Under your observation, what proportion of persons who escape on full exposure to diphtheria have previously had the disease?
32. Please state all the facts (relative to age, intervals between attacks, severity of previous attack, other exposures, etc.) as to previous attacks of diphtheria, concerning persons whom you have observed to escape the disease when fully exposed.
33. Please state all other facts, under your observation, relative to immunity from diphtheria among persons apparently exposed to the disease.
34. What proportion of the *mild* cases of diphtheria observed by you have been of persons under ten years of age?
35. What proportion of the *severe* cases of diphtheria observed by you have been of persons under ten years of age?
36. What proportion of the cases of diphtheria observed by you in persons aged *under* ten years have proved fatal?
37. What proportion of the cases of diphtheria observed by you in persons aged *over* ten years have proved fatal?

JOHN H. KELLOGG, M. D.

JOHN AVERY, M. D.

Committee.

Replies to the foregoing circular were received from the following persons, 53 in number:

John Avery, M. D., Member Michigan State Board of Health, Greenville, Mich.	D. W. C. Burch, M. D., Rockford, Mich.
Samuel W. Abbott, M. D., Member State Board of Health of Massachusetts, Boston, Mass.	G. H. Carpenter, M. D., Member West Virginia State Board of Health, Morrefield, W. Va.
R. F. Beebe, M. D., Union City, Mich.	G. E. Corbin, M. D., St. Johns, Mich.
S. M. Bemiss, M. D., New Orleans, La.	H. O. Clapp, M. D., Mendon, Mich.
W. Brodie, M. D., Detroit, Mich.	G. E. Case, M. D., St. Louis, Mich.
	E. P. Christian, M. D., Wyandotte, Mich.

- E. M. Conklin, M. D., Tecumseh, Mich.
 J. W. Compton, M. D., Member Indiana State Board of Health, Evansville, Ind.
 W. M. Chambers, M. D., Member Illinois State Board of Health, Charleston, Ill.
 J. H. Carstens, M. D., Detroit, Mich.
 A. L. Cory, M. D., Stanton, Mich.
 H. H. Chase, M. D., St. Helena, Cal.
 S. Dubois, M. D., Unadilla, Mich.
 I. Dever, M. D., Hastings, Mich.
 Orton Edie, M. D., Grand Rapids, Mich.
 E. S. Elder, M. D., Indianapolis, Ind.
 Drs. Furniss & Tipton, Selma, Ala.
 G. E. Frothingham, M. D., Prof. of Materia Medica, Ophthalmic and Aural Surgery, and Clinical Ophthalmology, University of Michigan, Ann Arbor, Mich.
 H. F. Formad, M. D., Prof. in University of Pennsylvania, Phila. Pa.
 Mason W. Gray, M. D., Pontiac, Mich.
 H. Gibbons, M. D., San Francisco, Cal.
 Francis W. Goss, M. D., Roxbury, Mass.
 Tyler Hull, M. D., Dimondale, Mich.
 S. V. D. Hill, M. D., Member Mississippi State Board of Health, Macon, Miss.
 John Kapp, M. D., Ann Arbor, Mich.
 C. E. Koon, M. D., Casnovia, Mich.
 H. S. Lay, M. D., Potoskey, Mich.
 R. W. Martin, M. D., Chatham, Va.
 Alfred Mercer, M. D., Syracuse, N. Y.
 J. H. Mabbs, M. D., Fillmore Center, Mich.
 Drs. Morse & Ketchum, Dowagiac, Mich.
 John Prudy, M. D., Grand Rapids, Mich.
 L. Julien Picot, Member North Carolina State Board of Health, Littleton, N. C.
 T. N. Reynolds, M. D., Detroit, Mich.
 A. J. Robb, M. D., Owosso, Mich.
 C. H. Rollant, M. D., Bay City, Mich.
 A. R. Smart, M. D., Hudson, Mich.
 P. P. Shorts, M. D., Ludington, Mich.
 Irwin Simpson, M. D., Niles, Mich.
 R. H. Stevens, M. M., Grand Rapids, Mich.
 E. Spalding, M. D., Grand Rapids, Mich.
 W. H. Smith, M. D., St. Clair, Mich.
 Chas. T. Southworth, M. D., Monroe, Mich.
 W. W. Vinnedge, M. D., Member Indiana State Board of Health, Lafayette, Ind.
 J. L. Valade, M. D., Newport, Mich.
 J. H. Van Deman, M. D., Chattanooga, Tenn.
 Bion Whelan, M. D., Hillsdale, Mich.
 F. A. Weaver, M. D., Chester, Mich.

In preparing the following summary it has been necessary to exclude all matters not strictly relevant, and to keep constantly in mind the fact that opinions are only valuable when based upon careful observation of facts. The limits of this paper have allowed the introduction of replies at length, in but few instances, those in which the facts presented were of exceptional interest.

REPLIES TO THE CIRCULAR.

The replies are as follows; the numbers introducing paragraphs refer to questions in the circular, on pages 47-48:

Question 1 (page 47).—Twenty-three make no reply; three have observed no such instances; three express opinions only, which differ widely; and twenty-two report cases observed, some of which we give below.

Dr. J. A. Mabbs reports an epidemic which occurred at Hamilton, Mich., in which the first case was followed by twenty others at intervals of six to ten days.

D. W. C. Burch, M. D., writes, "I know of one case which in my judgment was contracted from a case of malignant erysipelas."

Dr. W. H. Smith reports a case of undoubted diphtheria in which the only apparent possible source of contagion was through the intimacy of the family with another family in an adjoining town, some members of which were in the habit of visiting Detroit, although none of the latter had the disease or were known to be exposed to it.

Dr. C. E. Coon reports cases communicated by a trio of Indian basket-peddlers from a settlement some miles distant where the disease was prevailing in a malignant form. The first case was followed in eight days by three others. The same interval was also observed in another case.

Samuel Dubois, M. D., reports the following case:

In the fall of 1890, a young woman employed as hired girl in a family was taken with a sore throat. Little attention was paid to it, but she left her place of employment for a short time and went home to her father's family, where a half dozen little brothers and sisters immediately had a mild form of diphtheria. All recovered. A young man living a half mile south, who was on friendly terms with the said young lady, also had a mild form of the disease, and recovered; but his sister, aged 14, one of a family of several children, took the disease in a most severe form, and died. Also a married sister of the young woman first mentioned, living about three miles distant, visiting at her father's with her three little children and husband, all had the disease in a not very severe form, and all recovered. But a young man working at the same place where the first mentioned young woman was, immediately after had an attack of diphtheria, left the place, went home and died. A brother of his, aged 14, was soon after taken and died with the same complaint.

No other cases occurred in the family where the disease first started; but a neighbor, living about half a mile to the southwest, permitted his little daughter to visit some friends in a neighboring town where some cases of the disease had occurred at about this time. The child, aged about 11, was taken with the disease and died, and was brought home to be buried. In about a year from this time her little clothes were got out from their hiding place, looked over, and washed. Immediately after this their three remaining children, of ages between 5 and 14, were attacked with diphtheria, and all died. The parents were also attacked, but recovered after a not very severe illness.

Dr. G. S. Case reports the following cases;

A boy of six had diphtheria and recovered. The house was disinfected with "lime, sulphate of iron, and carbolic acid." Two older boys, aged ten and twelve years, respectively, who had been sent away to avoid the disease, returned after two weeks. The oldest contracted the disease and died.

Dr. Geo. Pray reports the following interesting cases:

"In March, 1881, the young sons of James Hall and George Staines, 10 and 8 years old, respectively, went to Ionia from their homes in Bushnell, Montcalm county, Mich., and spent part of a day there, where it is supposed they in some way contracted diphtheria, as in a few days after they were both affected with that disease and young Hall died. The disease had not been in their neighborhood for years before. The parents of both these lads, constituting the family in each instance had the disease.

"Nothing more was heard of it until in June following the family of George Stoddard, living a mile and a half from Hall's, were affected with a mild sore throat—so mild that they were not confined to the house, but played about out of doors. Finally a brother's child, living in the same house, was affected so severely that a physician was called who recognized it as diphtheria. All of both these families, 10 in number, were affected with the disease, except the fathers, and all in a very mild form except one. George Stoddard had been employed as a nurse in the family of James Hall, during their sickness, and cleaned the house and did the washing after the disease subsided, and did not return to his family during the time. He claims he purified himself thoroughly and changed all his clothes before he went home, but rolled up the clothes he had worn while at Hall's in a bundle, and took them home to have them washed. This is supposed to have been the source of contagion in his family.

"George Thomas lived about twenty rods from Stoddard's, and his children played daily with Stoddard's, while affected with the disease, and soon came down with diphtheria in a severe form, the whole family, seven in number, having it, and two dying. The water supply for both these families was not above suspicion. The well for both was in a barn-yard, but in heavy clay soil and well banked up.

"The family of a brother of George Thomas lived a half mile away. All intercourse was cut off between the families, except that one day a young man from the brother's family came to a wood-house detached from the house of George Thomas, on some errand, but did not come in direct contact with any of the members of the family. Shortly after he came down with the disease, and in turn all of his family, nine in number, except one boy, had the disease more or less severely, none dying.

"About sixty rods from this family, lived a brother-in-law, John Staines, who had a family of three children, who were kept entirely away from all persons who had the disease, or who had been exposed to it, until all were well and all danger was supposed to be over. His boy, sixteen years old, helped George Thomas, above mentioned, thresh, three months after his family had the disease, and thus became in contact with different persons who had been affected, and with a locality where the disease had existed in a bad form, and shortly after got the disease and died, as did also a younger brother; while his sister in the same house escaped entirely.

"In February, 1882, a young man came to the house of Alf. Wilson, of Ronald, Ionia Co., from some point in the lumber region. Soon after a son of Wilson came down with diphtheria, and soon the whole family, seven in number, were all affected with the disease, except the above-mentioned young man, who escaped without a symptom, though closely shut up in a small house with the sick. Three of the family died. After the disease had broken out he divulged the fact that he had just come from a house where the disease had been prevailing for a long time in a severe form. He claimed that he had thrown away all of his old clothes and bought new ones throughout; but he had brought his unpurified body, and an old satchel and a pair of boots which had been hanging in the room where a person had been sick and died from the disease. The disease did not spread from this family, as the house was closely quarantined until all were entirely well and thoroughly purified, when the family moved to another house and the old one was burnt down by the local board of health."

G. E. Corbin, M. D., reports a case in which the disease was communicated by a bed blanket which had been washed and retained for a time in the house of a washer-woman who had two children sick with diphtheria, both of whom died.

V. A. H. L.

It was not known that the blanket was used. It was not returned until more than two months after the death of the children, and appeared to have been well washed. A month after the blanket was returned it was placed on the bed of a child which had been previously strictly quarantined to prevent contraction of the disease, being first aired for a few days. In a few days the child was attacked with diphtheria reported as "of a serious grade."

Dr. Corbin also reports a case in which the disease was communicated by a nurse who had cared for cases of diphtheria some weeks previous; and another case in which a child, who had been previously unexposed, contracted the disease twelve days after occupying rooms in which two children had died of diphtheria a month previous.

Dr. R. H. Stevens reports the following interesting case:

Children at Van Dyke's had diphtheria. Were visited by Mr. and Mrs. Smith. Within ten days Mr. Smith's two children had diphtheria. Mr. Jones called with his boy, aged 11 years, to escape a shower, while Mr. Smith's children were sick; after which Mr. Jones's boy was sick with diphtheria. Not knowing that Mr. Jones's people were sick with diphtheria, Mr. and Mrs. Goodwin and their little girl called. Two weeks after Mr. Goodwin's little girl was taken with diphtheria. Six weeks after Mr. White, a "ragman," dealt with Mr. Goodwin and took rags in part payment, which were the garments of Mr. Goodwin's little girl about the time she was taken ill. Some of said rags were purchased by Mrs. Brown to make a carpet. Eight days later Mrs. Brown's children were taken with diphtheria. Up to this time Mrs. Brown's children had been completely isolated from all cases.

Dr. W. W. Vinnedge reports an epidemic of diphtheria in which several cases were directly traceable to contagion. A child died in a certain house; a year later a family in which there were two children moved into the house. In less than a month both had the disease, and the older of the two died. Members of two families visited at the house during the illness of the children. In one family four children had the disease two weeks later, and in the other family three children suffered about the same time.

Dr. Bion Whelon reports a case in which a physician who was attending his own child sick with diphtheria contracted the disease through a wound on his forehead occasioned by a kick from a horse. The wound was much exposed to the breath of the child. Four days after the accident symptoms of diphtheria made their appearance, the wound becoming covered with the characteristic membrane.

Dr. I. Dever reports the case of a doctor who carried a piece of diphtheritic membrane with his tobacco to convince his patients of its innocuousness; he contracted the disease and died. Has seen no case which could not be readily traced to contagion.

Dr. H. C. Clapp reports an epidemic which occurred in his neighborhood in May and June of 1881, the first case occurring in school. Three others of the family contracted the disease. A neighbor's girl called, and in a week came down with the disease, communicating it to her brother, who had a very slow convalescence, complicated by paralysis of the lower extremities. A lady relative came in to assist, and in a few days three of her children were attacked.

Dr. R. W. Martin reports the case of a lady, thirty years of age, who was summoned to the bedside of a sister sick with gangrenous diphtheria. She arrived two hours after her sister's death, and assisted in the preparations for her burial. Five days after she was herself attacked with diphtheria, although she had not been exposed otherwise than at the time mentioned.

Dr. J. W. Compton reports a case in which a physician while swabbing the throat of a diphtheritic patient received upon an abraded surface of his hand a portion of membrane expelled by the patient in coughing. A diphtheritic membrane formed on the sore, the hand became inflamed, the inflammation

extended up the arm to the shoulder, and the hand became swollen and painful. An epidemic of the disease originated by contagion of four cases in one family, which had been treated for "*malignant mumps*." Neighbors called to see the new disease, thus spreading the contagion all over the neighborhood. It appeared only in families who did such visiting.

A little girl, aged eleven years, contracted the disease by washing the spoons and glasses used by a little brother who was suffering with diphtheria, although the sick child was strictly quarantined, and the little girl was in communication with him in no other way.

A little boy was sick with what his physician called "*erysipelas in the leg*." He had no other difficulty. His little sister went to a school picnic; complained of headache, but remained during a portion of the exercises. Was carried home in the afternoon. The little boy died that evening, although he was considered nearly well in the morning. The next morning it was discovered that the little girl had diphtheria. In less than a week a large number of children present at the picnic were sick with diphtheria in a very severe form.

Dr. E. M. Conklin reports the following cases:

Mrs. C. nursed her oldest daughter through a course of diphtheria, fifteen miles from home. The disease was of medium severity. Mother wore same clothes at home, and in about a week her four-year-old girl was taken sick with diphtheria. The next day a second child was taken sick, and two days later two others, who were followed by another child. All suffered with a malignant form of the disease. Three of the five died. The family were poor, dirty, and ill-fed; all living in two rooms, with no conveniences.

2 and 3. (page 47)—There were thirty-six replies to these questions as follows: Two have observed no sporadic cases. One was not certain of having made such an observation. Seventeen have seen such cases, but give no details except respecting the sanitary conditions, concerning which six state that they were bad. Two report the sanitary conditions very good, and the remainder, that they were not particularly bad. Sixteen have observed sporadic cases of the disease, and describe cases in detail.

Dr. J. A. Mabbs reports a case as follows:

"In February of 1882, there occurred a case at Fillmore Center, three and one-half miles from Hamilton, and no other means of contagion from any person, except from me, as the child brought milk to my house each day while I was visiting patients [presumably sick with diphtheria, though not so stated] at Hamilton."

Dr. John P. Furniss reports a case of a girl nine years old, living four miles in the country, in a house isolated, and situated upon an elevated spot. There had been no communication with other persons. The disease had never been known to appear in the neighborhood, and there was only one case at the time in the county, and that four miles distant. The sanitary conditions of the premises said to be good.

Dr. P. P. Shorts reports sporadic cases in which no source of contagion could be discovered, unless it may have been communicated through letters received from friends who had the disease in their families. In other cases, no possible source of contagion could be discovered.

Drs. Morse & Ketchum, of Dowagiac, report a case of a girl, nine years of age, in a family of six children. The only possible source of contagion, aside from local conditions, was a visit from friends coming from Pennsylvania, although, so far as known, they did not come from an infected district. The sanitary conditions were bad; house old and damp, and set low or on the ground.

Dr. D. T. Reynolds reports most of the cases of diphtheria he has treated as sporadic. He summarizes his cases as follows:

Case 1.—A waitress in the basement of a three-story house on a corner. Well drained. Girl

slept in third story. *Case 2.*—Girl, employed in general house-work in a cottage without a cellar, and water-closet out of doors. *Case 3.*—Boy, nine years of age, living in a new brick house on River Road, opposite the Fort on west side of Detroit. The case may have been the result of contagion, as the boy had attended a school, some members of which had suffered with the disease. *Case 4.*—A young married woman, in a well situated cottage, with water-closet out of doors. *Case 5.*—Patient lived in a cottage, with cellar, and with water, or a large amount of moisture constantly under the house. No communication with the city sewers. Child died on the fifth day.

Dr. G. L. Case mentions the case of a boy aged six, residing in a town in which there were no other cases, and none within the distance of six miles. The sanitary conditions were good. Dr. C. mentions several other cases occurring in the same family, with no other cases within a mile and one-half at the time, and "no actual exposure." Two of the patients, girls aged respectively fifteen and seventeen, died. The whole family lived in one room, and no disinfectants were used, yet two children, aged respectively five and eight, escaped the disease.

Dr. A. J. Robb reports a case which occurred twenty-five miles from town, in a house situated on a prairie. It was the first case in the neighborhood, and, on careful inquiry, no source of contagion could be discovered. The sanitary condition appeared to be good. There were several other small children in the family, but none contracted the disease.

Dr. D. W. C. Burch reports a case occurring in a family which had received no visitors for four weeks previous. The child had not been from home during that time. No case of diphtheria had occurred within five miles for three years previous. The sanitary conditions were apparently good, with the exception of a pig-sty, forty feet from the house.

Dr. H. S. Lay reports cases in a family residing six miles from town, in the woods, off from any public traveled road. The child had not been away from home, and there had been no visitors to or from their place. It was impossible to ascertain any source of contagion. The habits of the family were uncleanly. The drinking-water was obtained from a running brook.

Dr. J. W. Compton reports three cases of the disease in one family, the first being sporadic; no source of contagion was traceable. The others contracted the disease from the first. The house was in a very unsanitary condition; cellar was filled with water; furniture was covered with mould; sink in the kitchen, connected with the privy by a pipe-drain, offensive, and odorous. Three other cases, all of which were fatal, were not traceable to contagion, but were attributed to bad plumbing, the house being filled with offensive odors. Water-closets were connected with the sewers. Three cases occurring in the country were not traceable to contagion, and could scarcely be attributed to unsanitary conditions.

Dr. S. V. D. Hill reports several sporadic cases. The first, a girl of four years, resulted fatally in five days. Family resided in the country. The water-supply was from a cistern which collected water from the soil, within fifty feet of which was an accumulation of the droppings of cattle and other stock. The second case was almost identical with the first. The third case, a child of six years, died in four days. The family lived in an old rotten log house near a malarial swamp.

Dr. Bion Whelan reports an epidemic in the township of Casnovia, Muskegon Co., which was confined entirely to a single school-district, and was not traceable to any contagious origin. Only one family in the district, in which there were children, escaped the disease. This family lived opposite the school-house. An investigation showed that the disease was fairly traceable to unsanitary conditions connected with the water-supply, the nature of which is fully

explained and illustrated by a diagram under the head of replies to question number 14.

Dr. A. L. Cory reports a case, the origin of which could be traced to no other cause than the premises, which were very filthy. The case gave rise to two others in the same family.

Dr. G. E. Frothingham has seen no case of diphtheria in which he thought the disease originated by contagion, and but one in which he attributed its origin to faulty drainage.

Dr. S. M. Bemiss reports two sporadic cases, in the first of which sanitary conditions were good, the drainage being bad in the second.

In a sporadic case reported by Dr. Mabbs, cattle and horses were kept under the same roof with the family, with only a board partition between.

Dr. Martin gives the following cases:

"My own child had a moderately severe attack of diphtheria. He had not been from home, and no person who had been exposed had visited my house. No packages or trunks had been received which could contain the germs. There was no case of diphtheria anywhere in the county, nor had I attended one for months. My old clothes had been replaced by new ones. The water and milk were pure, and there were no local causes of foul exhalations.

"Another case occurred in a family which paid particular attention to hygienic measures. No amount of inquiry or investigation could discover the cause of the disease. This case was a severe one, the child requiring several months to recover.

"The third case was of a little boy aged four years, who was particularly well cared for by his mother; in fact she was scrupulously careful in regard to his diet, his clothing, his person, and his company was constantly looked after, yet he had diphtheria when there was not another case in that region. There were no soil saturations, the drainage was good, the water was fresh and pure, milk pure, diet and clothing good, no foul emanations on the premises, and no source of impure air in the neighborhood. Diphtheria had not prevailed anywhere in this region for years before."

Dr. Pray reports the following interesting cases:

In the winter of 1880-1 a child of A. W. Strong died of diphtheria. No source of contagion was traced. Mr. Strong was a manufacturer of cider, vinegar, and fruit jellies on a large scale, and a fruit-drying establishment was also situated only a few rods from his house, and the air was contaminated with the fumes of large accumulations of pumice and refuse fruit. No other member of his family was affected; but about two months after a young daughter of his father-in-law, who lived about sixty rods away, was affected, and was very sick. No other member of the family was affected, and no other case occurred in the neighborhood until in the summer of 1882, when a boy of Henry Hall, who lived just a half mile north, was affected and died. No certain source of contagion was traced, although a man, a stranger, who applied for work on the farm, was kept for a couple of days, and it was surmised by the family that he might have brought the disease with him. In this family the sanitary condition was excellent in every way, and no other member of the family was affected, nor did it spread. These three last-mentioned cases all occurred in close contiguity to each other, in families nearly related and intimate with each other, but long intervals of time intervened between them. It may perhaps be proper to state that the cases above mentioned were also in the same neighborhood and school-district with those mentioned before where the contaminated water-supply was thought to be a possible cause.

Since writing the above another case has occurred in the family of A. W. Strong, above mentioned, without any known exposure to contagion, except that about a week before the child was taken sick the mother with the child visited at Henry Hall's, where a child died last summer with diphtheria, as above narrated, and took a nap on a lounge on which Hall's child lay during his sickness. The disease has now been lurking in that circumscribed vicinity for nearly four years, breaking out occasionally at quite long intervals.

In the physiological laboratory of Dr. Formad a member of the committee saw the bodies of two white rats, which had died but three days previous from diphtheria. A few days before, Dr. Formad had found that two or three of his white rats were ill. On making a careful examination, he found that they were suffering with diphtheria. So far as known they had not for months been exposed to any possible means of infection. The case was apparently one of spontaneous origin. An examination of the surroundings showed abundant source for the germ causes of the malady, as the floor in which the rats were kept was strewn with bones and fragments of meat,

and other putrefying material, a large number of dogs being kept in the same apartment for experimental purposes.

4. (page 47.)—Of the twenty-nine replies to this question ten are in the negative; seven answer "sometimes;" three state that the disease was present in the neighboring districts; one says "not as a rule;" one "variable," and mentions the fact that six months before the case reported occurred two cases occurred six miles distant; four answer "yes;" one refers to a case of diphtheria three years previous; one reports a case three and a half miles distant.

5. (page 47.)—But few replies to this question were received. The village in which a case reported by Dr. Mabbs occurred, was connected with the town in which the disease was prevailing, some three miles distant, by railway and carriage road.

Cases observed by Dr. Furniss were in an opposite direction from the prevailing winds, but on the line of travel.

Dr. P. P. Shorts reports a case living near the railroad, and thinks it possible the contagion was derived from this source.

Six months previous to the epidemic reported by Dr. Whelan two cases had occurred at some distance away, not on the line of travel, but in the direction of the prevailing winds.

6. (page 47.)—Of the eleven answers to this question four are affirmative, seven negative. Dr. Mercer replies "yes and *vice versa*."

Dr. Simpson reports nine cases of this sort in the last three years.

Dr. Furniss reports the case of a child which contracted a severe form of diphtheria by sleeping with its mother, who was suffering with "sore throat of a character to which she was subject." The child was two years old, and died after one week's illness.

Dr. Dever reports an instance in which a child supposed to have a mild tonsillitis communicated a disease to other children, which developed as a malignant form of diphtheria.

Dr. Martin reports the following case:

"I was called to see a boy with sore throat. I found him only a little sick, and the fauces were slightly red and a little painful when he swallowed. The case was so mild that I told the father that I did not think his son had diphtheria. He recovered perfectly without further trouble, but three days after I was called to the house again, and found three other children *fearfully* sick with diphtheria."

7. (page 47.)—To this question twelve answer "yes," and four "no." For cases see answers to preceding questions. Dr. H. F. Formad replies "yes" to both this and the preceding question.

8. (page 47.)—Two report conditions variable; two report that the sanitary conditions were not defective, so far as could be observed; one says "poverty and dirt;" one thinks the depraved condition of the system, rather than the surroundings, was the cause. In one reported case some cans of milk had been upset into the well which supplied the family with water for drinking and cooking purposes. The water was so foul as to taste very bad.

Dr. Kellogg observed a few years ago a case in which a child suffered with diphtheria in very severe form, the only apparent source of contagion being the use of a drinking-cup which had been used by a day-laborer, who at the time was suffering with a sore throat, the severity of which was not such as to prevent his continuing work as usual. This case was a very severe one, the throat and nasal cavity being entirely covered with the false membrane.

9, 10, and 11, (pages 47-8.)—Dr. H. F. Formad replies for himself and Dr. Wood, as follows: "We observed spontaneous diphtheria in rabbits,

chickens, and rats at times when no diphtheria had been about for months, or not at all, and when no possible source of contagion could be discovered."

The report of Drs. Wood and Formad, previously referred to, records the following very interesting fact, which may be quoted in this connection:

"One of the families visited by Dr. Formad in Michigan lived in the woods in a rather isolated place. Nevertheless, four of the children suffered with the disease. The slops from the sick room were thrown out with the kitchen refuse and eaten by the pigs. One of these latter speedily sickened and in a few days died. An autopsy was made by Dr. Formad, and the stomach with the lower end of the œsophagus was found in a state of intense inflammation and covered with a dense, very thick, false membrane, representing all the macro-and micro-scopic appearance of a true diphtheric exudation. It was simply loaded with micrococci. Moreover, the blood of the pig was full of micrococci, both in zoogloea masses and in the white cells, and micrococci emboli were found in the kidneys, spleen, etc. Further, in a number of experiments we produced fatal diphtheria in rabbits and other animals by inoculating them with material taken from the pig.

"The pig undoubtedly died of gastric diphtheria, in which a local affection of the stomach produced a general systemic disorder."

Dr. Compton reports the following very interesting case: Four persons in one family had malignant diphtheria. Cornmeal, wet in cold water, was applied to the throat, and when changed was thrown out. Chickens and pigs ate of the meal and died with what appeared to be diphtheria.

As no replies were received to question *No. 11*, we may be allowed to introduce the following interesting facts, derived from other sources, and believed to be reliable:

"A case is reported at Oberlin, O., in which a cat took diphtheria and then conveyed it to five children. A few months later the physician who had attended these cases was called to attend a young lady afflicted with diphtheria, who died on the third day of her illness. She and her sisters had a few days previously been charitably engaged in removing some obstruction from the throat of their pet cat, subsequent investigation revealing the fact that the obstruction was diphtheritic membrane. In these instances the cats were made the carriers of the contagion by contracting the disease either from some pre-existing case among animals of their own kind or among people who potted them, or it may be from some unsanitary surroundings."—*Sanitary News*.

Dr. Hewitt, of Lake Superior, relates another case in which this malady was communicated by a cat:

"For several days a pet cat had been suffering from enlarged cervical glands, other cats were similarly affected. The cat died in the house, and on the day of its removal there broke out in this family a most virulent form of diphtheria, resulting in the death of two of his children, the doctor barely escaping with his life. Up to this time the neighborhood was remarkably free from sickness of any kind. The disease spread, and very soon a large portion of the inhabitants were down with the disease."

12. (page 48).—Dr. Corbin reports a case in which the disease was communicated by a blanket, washed and retained for some time in a house where a child was sick with diphtheria.

In the case reported by Dr. Stevens, already referred to, the disease was communicated by the dress of a child who had been ill with the disease, which was sold to a rag-man, and afterwards used by a family in making a carpet, resulting in the contraction of the disease by the latter.

Dr. Martin reports a case in which the disease was contracted by a mother through kissing her child who was ill with the disease. Another case is reported by Dr. Martin, in which the disease was contracted by the emanations from a person dead with the disease, and another in which a little girl contracted the disease by washing the dishes used by a diphtheritic patient.

Dr. Burch gives a case of a married lady, who held a young lady in her arms while dying. After laying the corpse down, she remarked: "I took her last breath right into my lungs;" called for camphor, and held some in her mouth. She died of malignant diphtheria, six or seven days after. She had been extremely cautious about cloths, sputa, excreta, in fact had not been down with the sick forty-eight hours.

13. No replies were received to question No. 13.

14. (page 48.)—Dr. Abbott reports cases of the disease occurring in a family, the only apparent cause being contaminated well-water, which had been rendered foul by accidentally receiving the contents of some cans of milk.

Dr. Hill states that he has, in several instances, detected organic matter in the water used by families in which the disease appeared.

Dr. Lay reports a number of cases in which he attributed the origin of the disease to the use of foul water in cooking, the water being taken from wells situated in dangerous proximity to privies.

Dr. Prudy reports a case of diphtheria occurring in a large family living in a small, dirty frame house, and obtaining its water supply from a cistern which was contaminated by the waste from the house and filth from adjoining stables.

Dr. Stevens attributes one case which came under his observation, to contamination by the water of a stagnant pool, into which the child fell while sailing on a raft. The pool was contaminated by surface drainage from a privy and a barn-yard.

Dr. Corbin describes the following conditions relating to sixteen cases of diphtheria occurring in a small area:

At the foot of Clinton Avenue, between Higham and Railroad streets, there have been sixteen cases of diphtheria, seven of which were fatal. In addition, should be mentioned one fatal case of typhoid fever, contracted by a man doing business in one of these two blocks. I am unable to learn that any child residing in these two blocks escaped diphtheria. There is no locality in our village more favorably situated for the concentration of filth, than are these two blocks. In addition to their own privy-vaults and cess-pools, they get the drippings and washings from those in the rear of the stores, for the whole length of the avenue. Besides all this, the drippings from several hotel barns, and several livery stables, tend and center in this direction. One more fact should be noted in this history. In this locality is a public well. Much water is drawn from it, and that which is usually considered to be of good quality; but at certain times surface water finds its way into the well in such quantities as to "make it too turbid for use." Directly over the top of this well stands a leaky trough, much used for watering horses. A portion of this water which drips from this trough must find its way back into the well. With a single exception, the water from this well was that exclusively used for drinking purposes, by all the parties in these two blocks who had diphtheria.

Dr. Bion Whelan thus describes the condition of the water supply employed for drinking purposes by a school which was the focus of a severe epidemic of diphtheria:

"Only one family with children, in the district, escaped, and they lived opposite the school-house. We naturally looked at the hygienic surroundings of the school-house for a clue to the origin of the disease, and found it in the water-supply. The water was obtained from a house adjacent, in which house two children died from the disease.

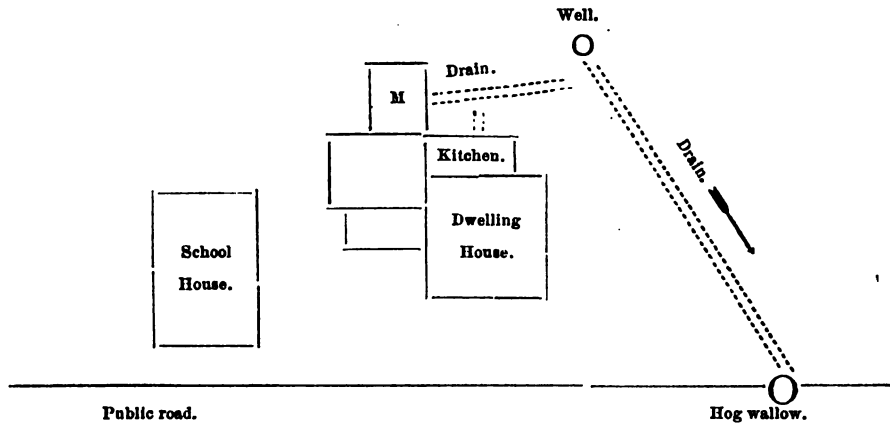
"In the rear of the house from whence the water was obtained, and partly underground, is a milk-room (M), from which extended a drain, into which was emptied the skim-milk and other dairy products. From the kitchen extended another drain, into which was emptied the kitchen refuse, joining the drain from the milk-house. The well has a drain extending from the curb to the public road. The other drains join this at about two feet from the well-curb. At the end of this drain at the public road, is a hog-wallow, completely blocking up the outlet.

"On taking up the large drain a short distance from the well, it was found to be filled with solid material, so it was evident that the small house drains emptied almost entirely into the well.

"Now, the children of the district were supplied with water from this well, with the exception of those of the family mentioned as living across the road, who always went home during the recess and drank at home. This family escaped, while all the others suffered from the disease in a particularly malignant form.

"About six months previous to this outbreak, there had been two cases of diphtheria about two miles distant, in a northeast direction; the routes of travel were not from the place of the first cases to the last, but the early spring winds were from N. E. to S. W.

"The following sketch may show better than words the bad sanitary surroundings:"

Contamination of a Well Used by School Children, Nearly All of Whom Had Diphtheria.

15. (page 48.)—Dr. Burch reports one instance in which he believed the origin of diphtheria to be traceable to contamination of the water-supply by an old burial-place; and another in which he attributed the contamination to surface-water from a privy. Barn-yards, cess-pools, and privies are mentioned by others as probable sources of contamination.

16. No replies were received to question No. 16.

17. No "facts" were received in reply to question No. 17, further than have already been given in the details of cases reported.

18. (page 48.)—Dr. Dubois gives an instance in which a mother who had lost a child with diphtheria a year previously, occasioned a new outbreak of the malady in her family, by washing the clothing of the deceased child which had been packed away in a trunk since its death. Her three remaining children took the disease and died.

One replies eight weeks; another says six months; another says sixty-two days; another instances a case in which the disease was occasioned by unpacking infected clothing which had been packed away for six years; two, six months; one, one year, and one, two years.

Dr. Avery, one of the members of this committee, was recently called to see a case of severe diphtheria which he was unable to trace to contagion, as there had been no known communication with any person suffering with the disease. On more careful inquiry he found, however, that the same patient had had malignant diphtheria two years before, and had recently unpacked the clothes worn at the time of the illness.

19. (page 48.)—One replies, six months; one, three months; one, twenty days; two, one year.

Dr. H. F. Formad replies: "Diphtheritic material, false membrane, pus, tissue, etc., lose their infective power by drying, and also from putrefaction, quite soon, within from three days to two weeks." Drs. Formad and Wood experimented only upon animals, which may be less easily infected than human beings.

Dr. Carpenter believes that the contagium of diphtheria may survive in an infected house indefinitely, unless a special effort is made to remove it by disinfection. In support of this view, he makes the following statement:

"The Mullin Hotel, a large brick structure, located in the center of this town, has, ever since the war (when it was used as a hospital) been peculiar for the number of cases of diphtheria among

the children of its inmates. I think I might say with safety that not a single child resident of that house has escaped an attack of the disease. The type has generally been mild; but several have proved fatal. Fortunately but few children are ever quartered there for any length of time. That there is a *resident contagion* I infer from the fact that other homes adjacent to this building, and with the same sanitary surroundings, are exempt from the affection. This house is well kept, cleanly, with large halls, rooms, and windows."

Dr. Christian regards plenty of pure air a speedy disinfectant.

20. (page 48).—Eleven answer "no;" two, "yes, after two years;" one "yes, within fourteen days;" one, "yes, but does not know what sort of disinfectant was employed;" one "yes, known to reappear in two weeks;" one, "yes, after house had been washed with bromochlorine and chloride of lime, and fumigated with sulphur;" one, "yes, after two years;" one, "yes, four months after disinfection according to the direction of the State Board of Health." Dr. Pray:—

"A hired girl came into a family four months after members of the family had had the disease, and after the house had been, as was supposed, thoroughly disinfected as directed by the State Board of Health, and newly papered and whitewashed. Soon after she came there she was affected by the disease, and without previous contagion. I suspect that she contracted the disease from the premises about the house not having been thoroughly disinfected."

21. (page 48).—Four replied that the disinfection was performed according to the directions of the State Board of Health. One fumigated with sulphur and also with chlorine; one, chloride of lime, and sulphur; two, sulphur fumigation; one, carbolic acid, one ounce to three gallons of water, solution used to wash room and furniture, sulphur fumigation, and carbolic acid; one, chloride of lime, sulphuric anhydride. One recommends washing with soap and warm water. Another recommends disinfection of clothing, boiling and exposure. One recommends that walls should be scraped, and that sulphur should be kept burning for a long time, and free ventilation for many days. One had used carbolic acid, chlorine, and sulphate of iron, and yet had had one instance of the reappearance of the disease.

22. (page 48).—Eighteen answer "yes;" two, "no." Two had observed such cases in the same house with cases suffering with a virulent type of the disease; one, "yes, but should not have thought the disease *diphtheria* had not other members of the family taken it." One has observed cases followed by constitutional disorders, sometimes death; one, "no," and adds that he always finds swollen cervical glands in such cases.

23. (page 48).—Of those who reply to this question, thirteen regard the false membrane as the only characteristic symptom of the disease; one replies, "constitutional disturbance, characteristic deposits, and exudations;" one, "membrane, enlarged glands, malaise, and fever." Dr. Mabbs: "In children, vomiting, sore throat, fever, flushed face, anxious expression, white patches in throat, or any abraded surface." Dr. Dever: "Chill, followed by fever, pain in back, swelling of tonsils, thick saliva, and white deposit." Dr. Simpson: "Deposit of false membrane, great prostration, sanious discharge from anterior nares." Dr. Brady: "Intense inflammation of tonsils, a purple, livid aspect, and characteristic membrane." P. P. Shorts: "Vomiting, pain in head, back, and bones, fever 101½° to 105°F., pale brownish or dark yellow exudations—sometimes greenish—epistaxis, and yellow coating of tongue, face swollen in region of parotid glands, submaxillary and lymphatic glands." E. Spaulding: "Chills, headache, backache, and sore throat." A. J. Robb: "Most prominent symptoms, ashen gray exudations, commencing on pharynx, rarely on tonsils." A. L. Cory: "Fauces and tonsils swollen, covered with ash colored membrane, adjacent tissues showing distinct marks of inflammation." H. S. Lay: "Membrane, dark red color of mucous membrane, glis-

tening of the parts as if filled with watery infiltration, offensive breath, and livid appearance of face." Dr. Whelan: "Peculiar odor." Dr. Beebe: "Inflammation of tonsils, patches on fauces, fever, and great prostration." Dr. Stevens: "Fever and fibrinous patches in throat." Dr. Abbott: "Fever, rapid and weak pulse, temperature somewhat elevated, loss of appetite, nausea, vomiting, tonsils, uvula, and soft palate red and swollen, grayish white spots appearing and becoming thicker, membranous, and more extensive, swelling of neck; membranes disappear by fourth to the seventh day; foul odor of breath; regurgitation of fluids." Dr. Martin: "False membrane. In epidemic those cases not having false membrane present a characteristic dull, dusky redness."

24. (page 48.)—Nine answer "yes;" twelve, "No;" one, "yes, where all the deposits are in the larynx, and death ensued without the appearance of deposit on the tonsils." Dr. Christian has seen cases in which the only local symptoms was in the larynx and below. Dr. Gibbon has observed that febrile attacks without membranous deposit are common during the prevalence of diphtheria. He suggests that such cases may be abortive cases of the disease. Dr. Abbott: "Yes, in the nose. Fatal in one case. One case in vagina—other patients having diphtheria in same house,"

One case is reported in which a boy, suffering with necrosis of the tibia, contracted the disease in the wound from children in a family who had diphtheria. The false membrane formed on the leg only. The constitutional symptoms were those usually observed in this disease.

25. (page 48.)—Seven answer "Yes;" fifteen, "No." Dr. Martin reports two cases in which the nervous symptoms were observed, although the throat symptoms were barely perceptible.

26. (page 48.)—Six reply that "the same course should be pursued as if the case were genuine." One says, "Disinfect." Another says, "Take no chances;" one, "Give the public and patient the benefit of the doubt." Four advise, "Quarantine and disinfection." Fifteen say, "Secure isolation until the case is decided. Disinfect and correct unsanitary surroundings." Dr. Pray recommends the same restrictions as regards quarantine in suspected as in more marked cases, and expresses the belief that in many instances it is very difficult for ordinary observers to distinguish diphtheria from follicular pharyngitis.

27. (page 48.)—Dr. Burch reports a case of relapse after four months. Dr. Dubois reports two cases of sudden death after apparent recovery. Dr. Christian has seen exudation disappear from one side and reappear on the other, and has observed the nervous symptoms to appear as late as one month after convalescence. Dr. Chase reports a relapse occurring in a patient twenty-three years of age, eight or nine days after convalescence. The patient recovered. Dr. Shorts has observed frequent relapses, and believes that one attack of the disease predisposes to another by occasioning such changes as render the system especially susceptible to the morbid poison of diphtheria. Dr. Martin has observed a number of cases in which a relapse occurred after the patient was plainly convalescent; in some instances with a fatal result. Dr. Spaulding reports the following case:

"A family of eight children, in a rural district, all had diphtheria and recovered. In four months they were all taken with a second attack, and all but one died within two weeks. The only indication that could be discovered as the origin of the disease, was the water they used, from a spring at the foot of a bank, with a barn-yard situated a few rods on a rise above it. The drainage probably filtered through into the water below."

Dr. Robb reports a case of sudden relapse, with death in a few hours, some

days after apparent convalescence. Dr. Case reports a relapse from taking cold ten days after convalescence was apparently established. Patient died.

28. (page 48.)—Thirteen answer "No." One believes it impossible. Twelve answer "Yes." Dr. Hill believes that one attack predisposes to another. Has known the disease to go through large families of children a second and even a third time. Dr. Burch reports the case of a lady who had well marked diphtheria after having suffered with the disease, in malignant form, four years before.

29. (page 48.)—One reports, "five years;" one "ten years;" one "nine years;" one "five years;" one "one year;" one "two or more years." These replies do not refer to any details not given in the replies to the preceding question.

30. (page 48.)—Dr. Edie: "Patient nineteen years of age; female; relapse occurred one year after first attack; patient died." Dr. Hill: "Mild attacks more apt to be followed by a recurrence than severe ones." Dr. Compton: "Family in the country had the disease in 1871; clothes were packed away; six years afterward were taken out and made into a carpet; disease reappeared in the family and those having it first had it again." Dr. Hull: "The diphtheria appeared in a family; one child died, and mother had it very severely; a few years later the disease appeared again; another child died and the mother had it again severely." Dr. Christian: "Second attack milder and more amenable to treatment." Dr. Lay: "Second attacks generally not so severe as the first." Drs. Furniss and Tipton: "First attack at three years; second at eight years; different residences." The case observed by Dr. Avery, previously mentioned, should also be noted under this head.

31. (page 48.)—One observer replies "all." Dr. Christiau: "Probably not one in ten." Dr. Elder: "All children, 50 per cent of adults." Dr. Spaulding: "Very many."

32. (page 48.)—Dr. Christian: "Have never known a second attack in one who had it first time in malignant form." Dr. Whelan: "Age and strength rather to be considered than previous attacks."

33. (page 48.)—One observer states the following case: "Two children, aged three and eight years, respectively, had diphtheria, and a brother and sister who had had it eight years before escaped, though constantly exposed; have observed a number of similar cases." Dr. Whelan: "Nursing babes and adults usually escape." Dr. Koon: "Nursing babes and adults often escape." Dr. Christian: "There must be constitutional predisposition as well as exposure." Dr. Edie: "Immunity the rule." Dr. Furniss: "Adults rarely contract the disease while nursing the sick." Dr. Dever: "Immunity the rule in persons having had diphtheria, and those over forty." Dr. Hill: "In a family in indigent circumstances three children were sick; two others were allowed to drink milk out of the same cup; did not contract the disease." Dr. Simpson: "I have seen some wonderful cases of immunity; enough to make me incline to disbelieve in the power of contagion." Dr. Reynolds: "I have seen both children and adults much in the same room with diphtheritic patients, but they did not contract the disease." Dr. Case: "Observed two fatal cases in one family, in which all lived in one room; no disinfectants were used, yet two younger children escaped, though one had just recovered from a very severe attack of fever and was much emaciated."

34. (page 48.)—Six report 50 per cent; three, 25 per cent; one, 30 per cent; one, 10 per cent; one, 20 per cent; three, "the largest proportion;" one, 40 per cent; one, 95 per cent; one, 80 per cent; one, 70 per cent; one,

"every case seen in the last few years;" one, "about two-thirds;" one, 25 per cent.

35. (page 48.)—Four answer 50 per cent; two, 80 per cent; one, 60 per cent; one, 99 per cent; one, "two-thirds of all cases;" two, 70 per cent; one, 80 per cent; two, "a large majority;" one, 75 per cent, and frequently more than this; one, 25 per cent; one, 95 per cent; one, 75 per cent; one, "one-third."

36. (page 48.)—Five answer 20 per cent; three, 10 per cent; three, 15 per cent; two, 25 per cent; two, 50 per cent; one, 40 per cent; one, 18 per cent; one, 60 per cent; one, 25 per cent in children under five, and 50 per cent between five and ten years; two, "small per cent;" one, 75 per cent of all cases.

37. (page 48.)—Six answer "none;" one, 10 per cent; one, "very small proportion;" one, 3 or 4 per cent; two, 25 per cent; one, 50 per cent; one, 15 per cent; one, 10 per cent; one, 16 $\frac{2}{3}$ per cent; one, 5 per cent; one, 6 per cent; one, 3 per cent; one, 50 per cent; one, 7 per cent; one, 2 $\frac{1}{2}$ per cent.

CONCLUSIONS.

The following conclusions respecting diphtheria, its nature, means of diffusion, communicability, etc., are drawn from the study of the disease which we have been able to make, including a careful consideration of the foregoing replies. Since the beginning of this investigation a list of questions has been sent out by the Therapeutic Gazette of Detroit, the replies to which have been published, and which contain many interesting and valuable facts, few, however, having any important bearing upon the questions asked in the circular sent out by this committee. The circular of the Therapeutic Gazette, with the exception of the questions respecting the contagiousness of the disease, had relation chiefly to the medical rather than the sanitary aspect of the subject, while the work of this committee has been confined entirely to the latter phase of the question.

Nature of the Disease.—The known facts respecting the ultimate nature of the disease, especially the interesting experimental investigation of Drs. Wood and Formad, seem to point almost irresistibly to the conclusion that the disease is due to the invasion of the system by a species of microscopic fungus known as *bacteria*, or by a morbid element so closely associated with the fungus as to be inseparable from it by physical means, and indiscernible in a distinct form by the most powerful microscope. The evidence afforded by the investigation referred to also justifies the conclusion that some of the phenomena of the disease may be due to the development during the progress of the disease of poisons in the body of the patient.

There is still room for discussion of the question whether diphtheria is a local or constitutional disease. Observed facts seem to justify the conclusion that in the majority of cases the disease is primarily local in character, although it cannot be denied that cases occasionally occur in which the constitutional symptoms make their appearance before there is any marked local manifestation. In this connection we would raise the query whether the mode in which the disease manifests itself is not determined to a considerable degree, at least in the majority of cases, by the manner of the introduction of the *materies morbi* into the system.

Causes of the Disease.—The theory advanced by Oertel, Eberth, Heuter, Klebs, and other noted European investigators, and recently confirmed by the elaborate experiments of Drs. Wood and Formad, is that one of the species of

vegetable fungus, known as bacteria in the form of micrococci, find their way into the system through various channels, setting up a series of morbid processes, which result in the various phenomena observed in this disease. As the contagium or poison usually finds its way into the system through the medium of air or water, the upper air-passages, particularly the throat, are the most exposed to the influence of the poison of the disease, and hence the most frequently exhibit its most characteristic features. Finding lodgment upon the mucous membrane at the upper fauces or other portions of the pharynx, the spores or micrococci of the bacterium soon begin a vigorous development. The growth of the bacteria results in inflammation and fibrinous exudation, by which the peculiar parchment-like membrane characteristic of the disease is produced. Continuing their development the bacteria find their way into the blood. Through this medium they soon infect the whole system, developing in the kidneys and spleen, and other internal organs in prodigious numbers to such an extent, indeed, in severe cases, as to block up the capillaries, and thus obstruct the circulation, and by interference with essential vital processes occasion death. While this process is going on the patient is continually throwing off by the breath, expectoration, urinary and fecal excretions, great quantities of the bacteria which may communicate the disease to others.

The variety of bacterium which is held to be the cause of diphtheria by most of those who believe in its bacterial origin, is one of the most common forms of bacteria, which abound wherever decomposition is taking place, and are undoubtedly present in the air in greater or lesser numbers at all times. A drop of saliva or a small portion of fur from the tongue, placed under a microscope, shows the fungus present in the mouth in considerable quantities. This is true of healthy persons at all times. The most critical microscopic examination shows no difference between the common micrococcus and that of diphtheria, but experiments show that there is a marked difference in the activity of the micrococcus, according as it is obtained from a healthy mouth or the throat of a diphtheritic patient. When obtained from the latter source its growth is very much more rapid and vigorous, which leads to the conclusion drawn by Drs. Wood and Formad, that it exists in two states, the micrococcus of diphtheria being an active state of the same organism which is comparatively passive under the conditions in which it is ordinarily found. By artificial cultivation the active micrococcus of diphtheria is converted into a passive, innocuous micrococcus, no longer capable of producing the disease, which would seem to be strong evidence of the identity of the two organisms.

Facts also seem to suggest the belief that the common micrococcus may be stimulated into an active condition by the abnormal activity of the tissue elements of an inflamed throat in which it may find lodgment, so that the ordinary micrococcus may be converted into the diphtheritic micrococcus by a pharyngitis, the result of cold or some other accidental cause. Drs. Wood and Formad hold that the same change in the micrococcus may occur outside of the body as well as in the manner suggested.

Dr. Formad presented to a member of the committee micro-photographs of micrococci from diphtheritic material from a malignant case of the disease which occurred at Ludington, Mich., and of micrococci from a case of ordinary sore throat, between which no difference is discernible. Dr. Formad also stated that he had produced diphtheria with the characteristic membrane by inoculation with micrococci from a case of ordinary sore throat.

This view of the nature of the disease explains very satisfactorily a large share

at least of the sporadic or isolated cases of diphtheria which are generally observed to occur in connection with bad sanitary conditions; and that there is an important relation between insanitary conditions and diphtheria is evident from the replies published in this paper. Many of the cases mentioned by correspondents show a connection between the disease and various unhygienic conditions too evident to be doubted. The following is a list of the principal insanitary conditions mentioned by correspondents as giving rise to cases of diphtheria: Damp houses, set low in ground; pig-sty near house and well; uncleanly habits; contaminated drinking-water; bad drainage; filthy hog-wallows in proximity to wells; cellar filled with water, and furniture covered with mold; sink connected with privy by drain pipe; sink drain passing through cellar and burst, discharging contents on floor near well; stagnant pond receiving drainage from barn-yard and vault; refuse matter from fruit-drying establishment; carelessness about disposal of refuse; cattle and horses kept under the same roof with people, only board partition between.

Contagiousness of Diphtheria.—Whatever may be the ultimate cause of diphtheria there is no room for reasonable doubt that the immediate cause, in the majority of cases, is contagion. The degree of contagiousness is, however, variable, differing with the intensity of the disease. Drs. Wood and Formad record an interesting observation made by them which may be mentioned in this connection; namely, that the activity of growth manifested by the micrococcus varies according to the severity or malignancy of the case from which the specimen is obtained. The fact that sporadic or isolated cases quite frequently occur does not militate against the fact of the contagiousness of the disease, since the same observation has been occasionally made respecting small-pox and other diseases, the contagiousness of which is well established. Neither, on the other hand, should it be claimed that since the cause of the disease is usually acquired by contagion this must always be the case. No such claim would be made for such diseases as erysipelas and puerperal fever, which are well known to be readily communicable, though capable of originating without contagion. It may be further remarked in this connection that the proportion of sporadic cases to those which can be directly traced to contagion is very much greater than in small-pox and other diseases of this class. When a child has symptoms of measles or whooping cough, the mother usually knows where the little one was exposed. This is by no means so uniformly the case with diphtheria.

Modes of Diffusion of the Disease.—The poison of diphtheria may be communicated in many ways and by a great variety of means. Among those by which communication is known to have taken place, the following may be mentioned:

1. The most frequent mode of communicating the disease is proximity to or contact with a person sick with the disease. The breath of a diphtheritic patient is heavily charged with the poison of the disease; hence the necessity for thorough and constant ventilation, to secure the removal of the poisonous emanations from the body and the lungs of the patient as rapidly as thrown off. Kissing a person sick with the disease is scarcely less dangerous than taking a dose of strychnia or arsenic.

2. Contact with a person acting as attendant to a patient suffering with diphtheria, or who has been exposed by visiting such a patient.

3. The personal or bed clothing of a patient.

4. Articles used about the patient.

5. The body of a person who has died with the disease.

6. The diphtheritic membrane itself is a most virulent means of communicating the disease.

7. The expectorated matters of a diphtheritic patient are scarcely less infectious than the false membrane, and should be received upon cloths and immediately burned.

8. There is reason for believing that drinking-water may become the vehicle for the poison of diphtheria in a like manner as for that of typhoid fever, through contamination with infected excreta from cess-pools or privy-vaults.

9. It is probable that the air of sewers may become contaminated by the diphtheritic poison when diphtheria is prevalent in a city, and may thus become a vehicle for the extension of the disease.

10. Milk may also probably become infected through a contaminated water-supply. A number of epidemics were reported in England which were traced to the use of infected milk.

11. It is known that the disease may be communicated from human beings to domestic animals in various ways, and there is reason for believing that the malady has also been communicated from domestic animals to persons.

Life of the Poison.—The facts reported concerning the length of time the diphtheritic poison may retain its activity must be considered not alone, but in connection with the theory held by the observer respecting the communicability of the disease. Those who regard diphtheria as a disease communicable only from person to person, either directly or indirectly, consider it a highly contagious malady and impute to its *materies morbi* a high degree of vitality. Cases are reported in which the disease was communicated by articles of clothing, the infection of which occurred many months, or even years, before. The experiments of Drs. Wood and Formad, however, show conclusively that either drying or putrefaction will, in a very short time, destroy the activity of the poison, as tested on rabbits and by cultivation. This is true even of portions of diphtheritic membrane, infected tissues, etc., which would naturally be supposed to be capable of retaining the activity of the poison fully as long as any other vehicle. It is impossible to reconcile the experimental facts with those reported by observers of the disease, and it is consequently at present impossible to determine with any degree of certainty the exact facts in relation to this point. Under the circumstances, the proper course to pursue is to regard the poison as being difficult to destroy, and possessed of great tenacity of life, which should lead to thoroughness in disinfection and avoidance of infected places which are not known to have been thoroughly disinfected.

Predisposing Influences.—1. The unusual susceptibility of young children is a fact generally noted by observers of this disease. The period of greatest fatality seems to be between the ages of one to five years. The susceptibility to fatal diphtheria gradually decreases between the ages of five and ten and becomes rapidly less marked with each additional year of life.

2. Many observers have noted that the disease is much more apt to attack a person suffering with an acute attack of catarrh of the throat than one who is in a healthy condition. This fact of course accords with the conclusion reached by Drs. Wood and Formad, that the inflammatory process may be a sufficient stimulus to develop the common micrococcus of the mouth into its active state in which it becomes capable of producing all the characteristic phenomena of diphtheria. It is probable that chronic pharyngeal disease by producing a hyperæmic and often raw condition of the mucous membrane of

the throat also predisposes to this disease. With this conclusion accords the fact that epidemics of diphtheria are most likely to begin and prevail extensively at those seasons of the year when acute catarrhal difficulties are most likely to occur and chronic affections of the same sort are aggravated.

3. The majority of careful observers hold that one attack exerts a protective influence against subsequent attacks of the same disease. If this be true, the fact that an individual had not previously suffered with the disease would increase his liability to it. So many instances of second and even third attacks are reported, however, it would not be proper at the present time to consider this point as thoroughly established. It would certainly be improper for an individual needlessly to expose himself to the disease with the hope that he would enjoy immunity from it in consequence of a previous attack.

4. There can be no question that bad hygiene or unsanitary conditions produce a predisposition to diphtheria, at least to the endemic form of the disease. The influence of this cause is little or not at all noticeable during the prevalence of a severe epidemic, as at such times the disease usually acquires a degree of malignancy, which gives to it a high degree of communicability and a virulency sufficient to overpower and obscure all other causes. In recognizing the influence of unsanitary conditions we do not necessarily endorse any theory of the disease, as the ultimate result will be the same whether we regard the influence to be a direct one giving rise to the essential elements of the disease, or indirect, by lowering the vital tone of the individual and thus increasing his susceptibility to the specific poison of the disease.

Period of Incubation.—The length of time elapsing after the time of exposure and the onset of the disease is usually very short—sometimes only a few hours—more often three to ten days; but many instances are recorded in which an interval of several weeks has elapsed between the exposure and the attack.

Characteristics of the Disease.—On this point nothing specially new has been developed by this inquiry, and it would be needless to repeat here the accurate descriptions of the disease which may be found in every standard work on medical practice. We would, however, reiterate the fact that the appearance of a false membrane in the throat cannot be regarded as the sole distinctive feature of this disease, and that during a general epidemic of diphtheria every case of sore throat must be looked upon with suspicion.

Disinfection.—Probably nothing better can be recommended on this point than the directions which have been prepared and for several years widely circulated by the State Board of Health. We would, however, lay particular emphasis upon the necessity of thorough disinfection of the bodies of the patient and of the attendants, as well as of their clothing and of everything in contact or communication with the patient. For this purpose we would recommend, when the physician thinks it proper for the patient, a warm full or tub bath, accompanied by thorough shampooing with good soap, followed by sponging of the entire surface of the body with a solution of sulphate of zinc, two ounces to the gallon. We would also raise the query whether thorough disinfection before burial of the bodies of those who die from this disease, especially when the disease assumes a malignant type, is not a sanitary measure worthy of adoption. This suggestion would apply with still greater force to cases of other diseases still more fatal in character and not less easily communicated from person to person.

Relation of Diphtheria to other Diseases.—While we cannot offer upon this point anything which may be said to be positively determined, there is little room left for doubt that there is some relation between this disease and the

affection which has been long known as *true croup*. There is also some suspicion of a relationship between diphtheria and scarlet fever, and the experiments of Drs. Wood and Formad seem to indicate a community of origin between diphtheria, erysipelas, hospital gangrene, and other septic diseases. This phase of the subject affords an opportunity for future investigation and study, which promises very interesting results.

J. H. KELLOGG,
JOHN AVERY.

THE WORK OF HEALTH OFFICERS, AND OF LOCAL BOARDS OF HEALTH IN MICHIGAN, INCLUDING DUTIES UNDER LAWS AMENDED AND PASSED IN 1883.

[Enough copies of this circular are sent to give one copy to each member of the local board of health, and this the officer receiving them is respectfully requested to do.]

[64.]

OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH, }
LANSING, MICHIGAN, SEPTEMBER 8, 1883. }

To the Officers and Members of Local Boards of Health:

GENTLEMEN:—Changes in the public-health laws having been made by the Legislature, and the circular of instructions to local boards of health being out of print, it becomes necessary, in order to meet inquiries frequently received, to issue this revised edition of the circular. It is hoped that you will give this circular careful attention and preserve it for ready reference.

There is a board of health in every township, city, and village in Michigan,* and the appointment of a health officer is required of every local board of health in the State by section 1693 of the compiled laws of 1871, as amended by Act No. 202, Laws of 1881, which amended section is as follows:

(1693.) Sec. 2. Every board of health shall appoint and constantly have a health officer who shall be a well-educated physician and act as the sanitary adviser, and an executive officer of the board: *Provided*, That in townships where it is not practicable to secure the services of a well-educated and suitable physician, the board may appoint the supervisor or some other person as such health officer. The board of health shall establish his salary or other compensation, and shall regulate and audit all fees and charges of persons employed by them in the execution of the health laws, and of their own regulations. Within thirty days after the annual township meeting in each year, the board of health shall meet for the transaction of business, and shall appoint or re-appoint a

* Township boards of health are organized under section 1692, compiled laws of 1871, as amended by act No. 56, laws of 1877, which section as amended is as follows:

(1692.) SECTION 1. In every township the township board shall be the board of health. The supervisor shall be the president, and the township clerk shall be the clerk of said board. The clerk shall keep a record of the proceedings of the board in a book to be provided for that purpose at the expense of the township.

The mayor and aldermen of every city, or the president and council of every incorporated village, in which no board of health is actually organized under the charter, are, by section 1740 of the compiled laws of 1871, as amended in 1879, granted all the powers and required to perform all the duties of a board of health. The amended section, 1740, is printed on the page following this.

health officer, and shall immediately cause to be transmitted to the Secretary of the State Board of Health at Lansing, the full name and postoffice address of such health officer, and a statement whether he is a physician, the supervisor, or some other person not a physician. A special meeting of the board may be called by the order of the president or of any two members of said board.

If no health officer is appointed in a township "within thirty days after the annual township meeting," it will still be necessary to appoint or re-appoint one after that time, as in the case of a vacancy; as will also be necessary if the officer appointed does not "qualify," or file his oath of office. Vacancies occur whenever the incumbent of an office ceases to be an inhabitant of the district, county, township, city, or village for which he was elected or appointed an officer,—see section 617, compiled laws of Michigan, 1871.

Before entering upon his duties the health officer should take and subscribe the official oath required by Sec. 1, Art. xviii., of the Constitution of this State, and file the same in the office of the clerk of the city, village, or township of which he is the health officer.

Some of the powers and duties of local boards of health are specified in Chapter 46 of the compiled laws of Michigan, 1871. This chapter was constructed more particularly with reference to township boards of health, but section 49 of the same chapter (chapter 35 of the Revised Statutes of 1846, and chapter 46 of the compiled laws of 1871) as amended by Act No. 145, Laws of 1879, makes it apply to cities and villages. That section, as amended, is as follows:—

<p>Board of health in cities and villages, who to constitute.</p>	<p>(1740.) SEC. 49. The mayor and aldermen of each incorporated city, and the president and council, or trustees, of each incorporated village in this State, in which no board of health is organized under its charter, shall have and exercise all the powers and perform all the duties of a board of health as provided in this chapter, within the limits of the cities or villages, respectively, of which they are such officers. The provisions of this chapter, and the amendments thereto, shall, as far</p>
<p>Duties of officers and inhabitants of cities and villages.</p>	<p>as applicable, apply to all cities and villages in this State, and all duties which are, by the provisions of this chapter, to be performed by the board of health of townships, or by the officers and inhabitants thereof, shall in like manner be performed by the board of health and the officers and inhabitants of such cities and villages, with a like penalty for the non-performance of such duties, excepting in cases where the charters of such cities and villages contain provisions inconsistent herewith.</p>

It is believed that there is nothing in the charter of any city or village in the State that conflicts with the general law which requires the appointment of a health officer by the council acting as a board of health, or by a board of health constituted under some charter provision.

One great object in securing a physician as health officer is to enable each local board of health to lead and not, as too frequently heretofore, to follow the people in sanitary knowledge and action. As a rule our physicians are our leading sanitarians, and they know much better than other people what are the sources of danger to the public health in their several localities; and, as a rule, they know best how to avoid those dangers. It is therefore for the interest of the people to secure the benefits of that knowledge by paying for the services and advice of the best sanitarian, who will usually be the best physician in their locality.

If it is true that responsibilities are in proportion to capacities and powers, then a local board of health, which, as in this State, has almost absolute power, must be held responsible for any sickness or death that might have been prevented by a proper use of its legal powers; and an individual health officer employed and paid for sanitary advice who does not use the sanitary knowledge of which he is possessed, in a way to make it as effective as possible for preventing sickness and deaths in his vicinity, is especially culpable.

Although as "an executive officer of the board" the power and authority of the health officer to act will be mainly that given him by his board, as a

"sanitary adviser" he should, and doubtless will, have influence in determining the action of his board, in proportion to his knowledge of sanitary science and his honest effort for the promotion of the public health.

The health officer should be a physician who has given and will give special study to sanitary subjects, and who is qualified to instruct and advise the local board of health in all matters relating to public health which may come before it. The law provides that he shall be a sanitary adviser of the local board of health; in order that his advice may be had to the fullest extent, it seems necessary that generally the health officer should meet with the local board of health.

The local board of health is authorized to fix the compensation, of the health officer, which should include his services at meetings of the board, compensation for his services in restricting and preventing contagious diseases, in reporting to the State Board of Health, etc. By section 3, Act No. 137, Laws of 1883 (printed on page 72), the health officer, unless the board of health has made other provision for compensating him, is entitled to receive from the township, city, or village, compensation at the rate of not less than two dollars per day for his services in investigating reports of small-pox, diphtheria, scarlet fever, or other communicable disease dangerous to the public health, for his services in the execution of legal measures to restrict the spread of such diseases, and for his services in reporting to the president of his board of health and to the Secretary of the State Board of Health respecting outbreaks of such diseases and respecting sources of danger from such diseases. By Sec. 1693, compiled laws 1871, as amended by Act No. 202, Laws of 1881, every board of health is empowered to regulate and audit all fees and charges of persons employed by it in the execution of the health laws and of its own regulations, including the salary of the health officer. Such of the charges as are payable by the township must be paid by the township treasurer upon orders signed by the supervisor and clerk. The law gives the board of health the right to audit its own expense accounts, and, in townships, the supervisor and clerk, being members of the board of health, can easily sign the orders on the treasurer.

The local board of health has two kinds of functions: 1. To utilize for its own people the sanitary knowledge already accessible, as indicated in sections I., III., V., VI., VII., VIII., following, and elsewhere in this circular; 2. To add to the general stock of such knowledge, by original research, by records of experience, and by reporting to the State Board of Health, which will thus be able to give to every local board the benefit of the experience of all the others. There are many ways in which the local board of health may put forth effort for lessening sickness and deaths within its jurisdiction:—

I. EPIDEMICS SHOULD BE PREVENTED.—This can generally be done, if local boards of health will but act efficiently in studying out and applying methods which are now practicable.

As regards prevention of small-pox, the law authorizes the board of health of each city, village, and township in the State to offer free vaccination to every child not previously vaccinated, and to all other persons who have not been vaccinated within the preceding five years.

The law (Act No. 146, Laws of 1879) is as follows:

SECTION 1. *The People of the State of Michigan enact,* That the board of health in each city, village, and township may, at any time direct its health officer or health physician to offer vaccination, with bovine vaccine virus, to every child not previously vaccinated, and to all other persons who have not been vaccinated within the preceding five years, without cost to the persons [person] vaccinated, but at the expense of such city, village, or township, as the case may be.

Vaccination and revaccination are preventives of small-pox, and if the people are kept thoroughly protected in this way it is believed that no epidemic of that disease can occur.

A document on the prevention and restriction of small-pox has been published by the State Board of Health, for gratuitous distribution throughout the State, and copies may be had by addressing the Secretary, at Lansing.* But small-pox is not the disease most to be dreaded in Michigan. Ten times as many deaths occur in the State from either scarlet fever or diphtheria as from small-pox; in some years more than twenty times as many. And while, for these diseases, we have no such preventive measure as is vaccination for small-pox, they are believed to be as truly preventable by means of isolation of first cases, disinfection of infected material, etc., as is small-pox itself.

Epidemics of communicable disease can frequently be prevented by restricting outbreaks to the first cases which occur.

II. PROMPT NOTICE OF OUTBREAKS OF DISEASE SHOULD BE SECURED.—For the most effective restriction of *all communicable diseases* one of the first requisites is that your board shall *promptly receive notice of every case* of a communicable disease. The law makes provision therefor, and it is especially desirable that the attention of the public in your vicinity be called to the requirements of the law, and the fact impressed upon the minds of the people that comparative safety from communicable diseases can be secured only by giving prompt notice of the first case and of all cases of any such disease, to the health officer or local board of health, in order that immediate steps may be taken for restricting and suppressing such disease. To complete the provision for such notices is one of the first duties of your board. It is again recommended that your board of health *have a sufficient number of blanks for such notices* for the use of *householders* and *physicians* distributed within your jurisdiction, in order to call attention to the law and secure the material for a complete record in your office and in the office of the clerk of your board. The two sections of law requiring such notices (1734 and 1735, as amended in 1883, together with the new section added in 1883 providing compensation for notices), and summary statements of sections 6852, 6853, and 6855, and of Act No. 157, laws of 1879, should be printed on the back of each blank. You can find the form for such blanks for notices, with the amended sections 1734 and 1735, and the new section, on the last leaf of this circular. Such blanks can be purchased of W. S. George & Co., of Lansing, for one dollar per hundred.

The law makes it the duty of the supervisor to prosecute for all failures to report cases of sickness in his township, in accordance with (amended) sections 1734 and 1735. The law also makes it the duty of every other township officer to notify the supervisor of all such failures within his knowledge or reasonable belief. It is the duty of the prosecuting attorney, on request, to assist the supervisor in such prosecutions. Sections 6852 and 6853, compiled laws of 1871, are as follows:

Duty of supervisors to prosecute.	(6852.) SEC. 12. It shall be the duty of every supervisor, whenever he shall know or have good reason to believe that any penalty or forfeiture has been incurred within his township, which shall be recoverable by action before a justice of the peace, according to the foregoing provisions of this chapter, forthwith to commence and prosecute a suit, in the name of the people of this State, for the recovery thereof.
Duty of other township officers.	(6853.) SEC. 13. It shall be the duty of every other township officer, who shall know or have good reason to believe that any penalty or forfeiture has been incurred within his township, forthwith to give notice thereof to the supervisors.

* The document has also been stereotyped by the Board, and any number of copies for distribution may be purchased of W. S. George & Co., Lansing, at the following rates, cash to accompany the order. The order should state whether they are wanted in English, German, or Dutch.

100 copies for.....	\$3.00	400 copies for.....	\$7.00
200 " "	4.50	500 " "	8.00
300 " "	6.00	1,000 " "	14.00

Act No. 157, laws of 1879, makes it the duty of every health officer of a village or city to give notice, to the prosecuting attorney of the county,† of any failure in householders or physicians to report cases of communicable diseases to the health officer or to the local board of health. The act makes no exceptions on account of any other similar provisions in local charters or ordinances. Omitting the title, the act is as follows:—

SECTION 1. *The People of the State of Michigan enact.* That it shall be the duty of Health officers to the health officer of each village and city in this State, whenever he shall know, or ^{notify prosecuting} have good reason to believe that any penalty or forfeiture has been incurred within ^{ing attorney of} his city or village, by reason of neglect to comply with section one thousand seven hundred and thirty-four or section one thousand seven hundred and thirty-five of the compiled laws of eighteen hundred and seventy-one, forthwith to give notice thereof, in writing, to the prosecuting attorney of his county, which notice shall ^{all failures to} state as near as may be, the time of such neglect, the name of the person incurring the penalty or forfeiture, and as near as can be ascertained, the name or names of persons sick with a disease dangerous to the public health, and not reported as the law requires. ^{What notice to}

III. COMMUNICABLE DISEASES SHOULD BE RESTRICTED.—When notice or information of the occurrence of a case of communicable disease reaches the local board, the board should act promptly for the restriction of the disease. To neglect or postpone such action is a great violation of public trust. As so much depends on prompt action on the appearance of the first case of a communicable disease, and in order that no time may be lost, it is the duty of every board of health to make provision for prompt action by its health officer, authorizing and directing him to be prepared at all times, as executive officer of the board, to take certain action without waiting for a meeting of the board, whenever a case of scarlet fever, diphtheria, small-pox, or other disease dangerous to the public health occurs within its jurisdiction. Some of the duties which the health officer should be directed to perform are specified in Act No. 137. Laws of 1883, as follows:—

AN ACT to specify certain duties of health officers and provide for compensation therefor, in townships, cities, and villages where the health officer is not otherwise instructed by the local board of health.

SECTION 1. *The People of the State of Michigan enact,* That whenever the health officer of any township, city, or village in this State shall ^{Powers and du-} receive reliable notice or shall otherwise have good reason to believe ^{ties of health} that there is within the township, city, or village of which he is the ^{officers in refer-} health officer, a case of small-pox, diphtheria, scarlet fever, or other ^{ence to diseases} communicable disease dangerous to the public health, it shall be the ^{dangerous to} duty of said health officer, unless he is or shall have been instructed by ^{public health.} the board of health, of which he is an executive officer, to do otherwise,—

Immediately to investigate the subject, and in behalf of the board of health, of which he is an executive officer,—

To order the prompt and thorough isolation of those sick or infected with such disease, so long as there is danger of their communicating the disease to other persons;—

To order the prompt vaccination or isolation of persons who have been exposed to small-pox;—

† Section 6855, compiled laws of 1871, requires the Prosecuting Attorney to prosecute for any forfeiture within his county. That section is as follows:

(6855.) SEC. 15. In the cases mentioned in the last preceding section, and in all other cases where the prosecuting attorney shall know or have good reason to believe that a penalty or forfeiture has been incurred within his county, it shall be the duty of such prosecuting attorney, without delay, to prosecute for such penalty or forfeiture; and in all cases where any suit shall be instituted by the supervisor, as provided in this chapter, it shall be the duty of such prosecuting attorney, if requested by such supervisor, to attend to and conduct such suit on behalf of the plaintiffs.

To see that no person suffers for lack of nurses or other necessities because of isolation for the public good;—

To give public notice of infected places* by placard on the premises, and otherwise if necessary;—

To promptly notify teachers or superintendents of schools concerning families in which are contagious diseases;—

To supervise funerals of persons dead from scarlet fever, diphtheria, small-pox, or other communicable disease which endangers the public health;—

To disinfect† rooms, clothing, and premises, and all articles likely to be infected, before allowing their use by persons other than those in isolation;—

To keep the President of his own board of health, and the Secretary of the State Board of Health constantly informed respecting every outbreak of a disease dangerous to the public health, and of the facts so far as the same shall come to his knowledge, respecting sources of danger of any such diseased person or infected article being brought into or taken out of the township, city, or village of which he is the health officer.

Provisions to have force of regulations of local boards of health in certain cases.
Penalty for violation of provisions.
Compensation of health officer.

SEC. 2. In the absence of regulations conflicting therewith, made and published by the local board of health, and still remaining in force, the provisions of section one of this act shall have the force of regulations made and published by the local board of health; and whoever shall violate the provisions of section one of this act, or the orders of the health officer made in accordance therewith, shall forfeit for each such offense a sum not exceeding one hundred dollars.

Proviso.

SEC. 3. In the fulfillment of the requirements of this act, the health officer, unless other provision shall have been made in accordance with law, shall be entitled to receive from the township, city, or village of which he is health officer, compensation at the rate of not less than two (2) dollars per day: *Provided*, That this section shall not be construed to conflict with any action by the local board of health, under section sixteen hundred and ninety-three, of the compiled laws of eighteen hundred and seventy-one, as amended by act number two hundred and two, of the laws of eighteen hundred and eighty-one.

The local board of health and the physician in charge of a case of a communicable disease should coöperate for its restriction. The local board of health should especially guard against its spread by cases where no physician is employed.

IV. CASES OF DISEASES WHICH ENDANGER THE PUBLIC HEALTH SHOULD BE RECORDED.—Another duty incumbent upon the local board of health is the recording of the sickness from communicable diseases, and of the deaths of citizens and persons under its protection; such records to be for local use and also to be reported to this State Board, so that, when grouped with the records of other localities, the conditions may be studied, and new methods of prevention learned from such unhappy experiences which otherwise will continually be repeated.

A form of "Record of Diseases Dangerous to the Public Health" is printed (reduced in size), on page 271 of the Report of the State Board of Health for 1882. You can procure printed sheets of such a record, on paper 15½ by 19½ inches, of W. S. George & Co., of Lansing, for eighty cents per quire or three dollars per hundred. If desired, the same dealers will bind them at usual prices.

* Required by section 1732, Compiled Laws of 1831, as follows:

(1732.) SEC. 41. When the small-pox, or any other disease dangerous to the public health, is found to exist in any township, the board of health shall use all possible care to prevent the spreading of the infection, and to give public notice of infected places to travelers, by such means as in their judgment shall be most effectual for the common safety.

† For methods, see pamphlet entitled "Restriction and Prevention of Scarlet Fever," issued by this Board, reprinted on pages 211-218 of the Annual Report of the Board, for 1881; also a document on "Restriction and Prevention of Diphtheria," reprinted on pages 205-210 of the same Report; also a document entitled the "Prevention and Restriction of Small-pox," issued by this State Board of Health, and printed on pages 288-304 of the Report for 1881, which documents may be had by application to the Secretary of the Board of Lansing.

V. MUCH SICKNESS AND MANY DEATHS FROM ORDINARY CAUSES AND DISEASES SHOULD BE PREVENTED.—Another important field of labor open to your local board of health, is the inauguration of measures for preventing sickness and deaths from the ordinary diseases in this State, a very great proportion of which are now believed by our best sanitarians to be preventable. Some of the prominent measures to be inaugurated are:—

1. More thorough drainage of the soil, especially near dwellings.
2. Better securities against the contamination of the water-supply, particularly in wells, by filth-saturated soil, etc.
3. A strict guard over the purity of the air, and freedom from nuisances and unclean places.
4. Better sanitary and hygienic arrangements and plans in the public schools, and in public buildings and institutions.

In the execution of these measures, much may be accomplished by systematic and thorough inspections and by published reports of such inspections, which shall attract attention to the subject, give definite knowledge of existing defects, and suggest methods of improvement.

5. TYPHOID FEVER is believed to be a disease often communicated by means of water or milk contaminated with the discharges from typhoid fever patients or with the remains of those who have died from the disease. Hence typhoid fever might often be prevented by a thorough disinfection of such discharges, and by requiring that those who have died from the disease shall be buried entirely away from all sources of water-supply, and by condemning sources of water-supply already thus contaminated.

6. CHOLERA.—The same precautions recommended to prevent spread of typhoid fever, should be taken on an outbreak of cholera. The discharges of the initiatory diarrhea of cholera are infectious, and these as well as the later discharges should be immediately and thoroughly disinfected.

7. TOY PISTOLS.—The Legislature, in 1883, passed an act (No. 138) to prevent the sale and use of toy pistols. While it is not made the especial duty of boards of health to enforce the law, the importance of the subject makes it proper for them to notify prosecuting attorneys of violations of the law coming within their knowledge.

8. INSPECTION OF PUBLIC BUILDINGS.—Act No. 226, Laws of 1879 as amended by Act No. 41, Laws of 1881, makes provision for inspection of public buildings in cities and villages, and makes it unlawful to use such buildings until they have been properly inspected and approved for use in accordance with the law. Boards of health in cities and villages might call attention of the proper officers to violations of this law, which is intended to guard against dangers to life. Act No. 182, Laws of 1877, makes it the duty of township boards, village trustees, and city councils to appoint a committee of three (one of them the chief of the fire department, or the fire-warden) to examine all hotels or public houses, more than two-stories high, and having thirty or more rooms for guests, as to provisions for protection of guests from danger by fire, and to report to the appointing body, which body is required to cause needed changes to be made in accordance with the provisions of the act. The act also makes it their duty (with the village president or city mayor) to examine all such hotels or houses, or cause them to be examined at least once in each year. Act No. 170 of 1883 also imposes duties on township and village boards and common councils in enforcing the provisions of said act with regard to fire-escapes in hotels, boarding and lodging houses, and other places of assembly.

9. **REGISTRATION OF PHYSICIANS.**—The Legislature, in 1883, passed a law (Act No. 167) requiring all who are to be legally qualified practitioners of medicine, surgery, or midwifery to file with the clerk of the county in which they propose to practice, a sworn statement relative to the opportunities they have had for gaining a knowledge of their profession. The health officer should be prepared to give information as to all the requirements of this law. The act makes it the duty of the health officer and the supervisor in each township, village, city, and ward to enforce this law.

VI. **NUISANCES SHOULD BE ABATED.**—While it is not, as many suppose, the first and only duty of a health officer to smell out a cesspool or an offensive privy, he is the one to whom, from his official position and authority, the people properly look to discover and abate any such nuisance. Freedom from such sources of sickness is believed to be one essential condition of good health in a community, and a duly empowered health officer or a board of health that from any considerations whatever does not do the utmost (and the power of a local board of health under the law is almost absolute) to prevent and remove such unsanitary conditions, is guilty of a plain neglect of duty and a violation of official trust. For a valuable discussion of the power of local boards of health in the abatement of nuisances, the reader is referred to a paper on the powers and duties of local boards of health, by Hon. LeRoy Parker, of Flint, published in the Report of this Board for 1879, pages 289–300; also a report by Homer O. Hitchcock, M. D., on Slaughter-Houses and Rendering establishments, on pages 65–80 of the same Report.

VII. **SANITARY INFORMATION SHOULD BE DISSEMINATED AMONG THE PEOPLE.**—The local board of health should be a center of sanitary and hygienic intelligence for its locality; its meetings should not be infrequent, and should be so managed as to secure papers or discussions on special subjects and on the application of the principles of sanitary science to the particular sources of danger in the immediate vicinity, and otherwise to encourage progress in sanitary knowledge, among the members of the board as well as among the people. Charged, under an official oath, with the duty of guarding the life and health of fellow-citizens, the duty of members and officers of boards of health to seek out the best that is known in public hygiene and sanitary methods seems to be plain. The best sanitary work cannot be done except by the coöperation of the people with the board of health, and this can be secured when the people are well informed on sanitary subjects; the thorough distribution by local boards of health of all such documents as the one issued by this Board on the Restriction and Prevention of Scarlet Fever and the one on the Restriction and Prevention of Diphtheria will tend to disseminate useful information and greatly decrease sickness from such diseases.*

Many sources of information in sanitary science and public hygiene are now accessible to those who can secure the literature of these subjects. You can doubtless find something of value without great effort. There are now many

* The documents on "Restriction and Prevention of Diphtheria," and on the "Restriction and Prevention of Scarlet Fever," have been revised and reprinted by the State Board of Health, and copies of either may be had free by addressing the Secretary, at Lansing; they have also been stereotyped by the Board, and copies of either may be obtained by local boards of health and others of W. S. George & Co., Lansing, Mich., at the following prices, cash to accompany the order:—

100 copies for.....	\$1.75	400 copies for.....	\$4.25
200 " "	2.50	500 " "	4.75
300 " "	3.50	1,000 " "	8.00

The order should state whether they are wanted in the English, the German, or the Dutch language.

works on hygiene, and many periodicals devoted to the subject,—several of them giving especial attention to particular branches of the subject. A knowledge of some of the sources of greatest danger to life in this State may be gained by a study of the Registration Reports on Vital Statistics of Michigan, published by the Secretary of State. These are, or should be in your township library. A few years ago a pamphlet compilation of the Public Health Laws of this State was sent to the health officer of each township, to be delivered to the supervisor, if no other health officer was appointed. The laws have been much changed since the publication of this compilation. The Secretary has been able to supply amended copies of the pamphlet on application, but only a few copies are left.* The first ten Annual Reports of this State Board of Health have been sent as issued, and are, or should be, in your township library.

The Annual Reports of the State Board of Health have been sent, year by year, to the health officers whose names and addresses have been returned to this office; but when no return of the name and address of the health officer is received, no Report is sent, because it is not known to whom to send the Report.

You will find something relative to work of local boards of health and health officers on pages 6, 11, 15, 16, 29, and 30 of the First Report (for 1873); on pages xi–xv, xxv, and xxviii–xxix of the Second Report; on pages xliii–xlv and 1–10 of the Third Report; on pages 6, 7, 11–12, 127, 128, 129, and 130 of the Fourth Report; on pages xxxii–xxxv of the Fifth Report (for 1877); on pages ix–xviii and xxiii–xxxiii of the Sixth Report (for 1878); on pages lvii–xli, 66–80, 291–300, 329, 330–1, 332–4 of the Report for 1879; on pages lviii, lxii–lxxii, lxxiii–lxxviii, lxxxiv–lxxxv of the Report for 1880; on pages 56–61, 299–304 of the Report for 1881; also on pages 7–15, 251–6, 262–73, 328–32 of the Report for 1882.

VIII. RULES BY THE LOCAL BOARD OF HEALTH.—An important means of disseminating information among the people is the promulgation of rules by the local board of health respecting nuisances, sources of filth, and causes of sickness, particularly sickness from contagious diseases. Such rules every local board of health is authorized to make, by sections 1694, 1695, and 1696, compiled laws of 1871. A set of rules recommended by the State Board of Health for adoption by local boards, was printed on pages xix–xxii of the Report for 1875.

Full public notice of such rules as may be adopted from time to time should be given, in accordance with section 1698, compiled laws of 1871, which is as follows:—

(1898.) SEC. 7. Notice shall be given by the board of health of all regulations made Notice of regula-
by them, by publishing the same in some newspaper of the township, if there be one tions, how pub-
published therein, and if not, then by posting them up in five public places in such lished.
township, and such notice of said regulations shall be deemed legal notice to all
persons.

The State Board of Health would be glad to receive copies of rules, regulations, and ordinances or blank forms adopted by the board of health of any township, city, or village.

IX. SPECIAL REPORTS TO THE STATE BOARD OF HEALTH.—Whenever there occurs, in your locality, any outbreak of a communicable or preventable disease,

* A new compilation, of laws in force September 8, 1883, has been ordered by the State Board of Health, and will soon be ready for distribution.

it is expected that the health officer will immediately send a special report* of the facts to the secretary of the State Board of Health and also inquire into, study, and record the conditions coincident with the rise, progress, and decline of any such outbreak, and, besides making the local record be prepared to make a valuable final report to this Board. Every such instance of suffering in your locality should be made to yield some valuable data useful for advancing the cause of public health; and such prompt special reports are here officially demanded, under the law.†

In order to be able to report to the State Board of Health as the law requires, the local board must collect facts. If the local board does not receive notices of cases of communicable diseases, this is, in some degree, its own fault; first, because the law requires each member of the township board, whenever he shall "have good reason to believe" that a forfeiture from neglect to report any such case has been incurred "forthwith to give notice" to the supervisor, and it is the duty of the supervisor "forthwith to commence and prosecute a suit;" and in cities and villages, the law makes it the duty of the health officer to report to the prosecuting attorney all cases of forfeiture under sections 1734 and 1735; and the prosecuting attorney is required to prosecute for all such forfeitures; and, second, the local board, by proper effort, may so educate the citizens under its care, as to the importance of promptly reporting all cases of diseases which endanger the public health, that prosecutions for neglect to report diseases will be unnecessary.

It is hoped that you will freely correspond with this office concerning the needs and the success of public-health work in your locality. Any information from you will be thankfully received, and any that we may give will be gladly rendered.

By direction of the State Board of Health.

Very respectfully,

HENRY B. BAKER,

[Please preserve the circulars received from this office.]

Secretary.

*For convenience in sending such immediate notice to the State Board of Health, a blank form [L] has been devised, [as shown in Circular 63, page 81 of this Report.]

† Act No. 81, Laws of 1873, Sec. 8: "It shall be the duty of the health physician, and also of the clerk of the local board of health in each township, city, and village in this State, at least once in each year, to report to the State Board of Health their proceedings, and such other facts required, on blanks, and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of Health."

HOUSEHOLDER'S OR PHYSICIAN'S NOTICE OF A COMMUNICABLE DISEASE.

[Form of Notice recommended by the State Board of Health for the use of Householdors and Physicians, in complying with sections 1734 and 1735, Compiled Laws of Michigan, 1871; as amended by Act No. 11, Laws of 1883; and section 1740, Compiled Laws of 1871, as amended by Act No. 145, Laws of 1872. See over.] [Full as many of the blanks in this notice as possible, but having learned of the sickness do not delay sending the notice in order to learn other facts provided for in this form.]

To the Clerk or Health Officer of the*ofState of Michigan, as Clerk or Health Officer of the Board of Health:

SIR:—The following persons, within the jurisdiction of your Board, have been taken sick with “diseases dangerous to the public health.”†

No.	NAME OF PERSON.	SEX.	AGE IN YEARS LAST BIRTH-DAY.	NAME OF DISEASE.	TAKEN SICK.		WHETHER DEAD, STILL SICK, OR RECOVERED.	DATE OF DEATH OR RECOVERY IF NOT STILL SICK.	
					Month.	Day.		Month.	Day.
1									
2									
3									

So far as known, the source.....of the contagious or infectious cause.....of the disease.....as follows: For case No. 1, it was.....

The residence of the sick persons above reported is as follows: Of case No. 1, it is at No.....street,.....; of case No. 2, it is.....

This notice is given by.....

Dated at No.....street,....., 188.....

* Insert the word city, village, or township.
† Includes Measles, Whooping-cough, Diphtheria, Scarlet Fever, Typhus Fever, Typhoid Fever, Puerperal Fever, Erysipelas, Small-pox, Cholera, etc.

COMMUNICABLE DISEASES IN MICHIGAN DURING THE YEAR ENDING SEPTEMBER 30, 1883.

BY THE SECRETARY OF THE STATE BOARD OF HEALTH.

This paper continues a subject treated for the preceding year on pages 362-435 of the Report of the State Board of Health for the year 1882, and for other years in preceding Reports. Whenever information is received at this office of the outbreak in any locality in Michigan of diphtheria, scarlet fever, or small-pox, a letter is sent to the health officer of the township, city, or village in which the disease is present (if the name of the health officer has been reported to this office, if not, to the President of the Board of Health), calling his attention (if the report was not received from him) to the existence of the disease within his territory, indicating his duties and powers and proper measures to be taken in restricting the disease, transmitting documents of instruction with regard to prevention and restriction of the disease, for distribution among families especially exposed to it, and asking for a report relative to the prevalence of the disease and the methods employed for and the success in suppressing it. The form of the letter now generally sent, and which is substantially the same as that used during the entire year, is as follows. The documents on restriction and prevention of each of these diseases, and the document on powers and duties of health officers and local boards of health, have been sent to all health officers and members of local boards of health when first published, or when new health officers have been returned. Copies of the appropriate document are sent again on the outbreak of one of these diseases, to make it certain that the health officer shall have them at hand, and that they may be distributed among people especially interested in the disease because of present danger to their own households.

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY, *Lansing, Mich.*, , 188... }

To.....
Health Officer of....., Mich.

DEAR SIR:—I am informed that..... is present in your jurisdiction. By mail I send you one copy of Circular 64, which gives an outline of the duties of the health officer and of the local board of health. I also send you..... copies of the revised document issued by this State Board of Health on the restriction and prevention of this disease; I trust you will distribute these where they will do the most good. It is of the highest importance that prompt, thorough, and persistent measures be employed for the restriction of this disease. Act No. 137, Laws of 1883, requires the health officer to act promptly, even if his board takes no action. (See page 5 of our pamphlet Circular No. 64* on "Work of Health Offi-

*[Printed on pages 67-78 of this Report.]

cers.") Directions for isolation and disinfection are given in detail in each copy of the document relating to this disease sent to you. In order to make the measures recommended most effectual, it is necessary to secure, either from the householder or the physician, prompt notice of each case of this disease. By proper effort it is believed that these notices may be secured under the law as set forth in sections 1734, 1735, 6852, 6853, and 6855 of the Compiled Laws of 1871, and Act No. 157 of the Laws of 1879. Sections 1734 and 1735 were modified by Act No. 11, Laws of 1883. I trust you and your board of health will do all that is possible to restrict this disease. Your action should be as prompt, efficient, and persistent as is commonly the case with the fire department on the outbreak of a fire. Any aid which this Board may be able to give you will be cheerfully rendered.

After the outbreak is over, I would be pleased to receive from you a final report of this outbreak, which report, in order to be of the greatest use in giving knowledge of the modes of spreading this disease and of the best methods for its restriction and prevention, should be exact and explicit; then abstracts of replies from localities where this disease occurs will, when combined, give valuable knowledge which may be published for general use in the Annual Reports of this Board. This being one object in view, your replies to the questions on the enclosed blank are urgently solicited. The questions to which replies are invited are as follows:

- 1.—What is the disease about which you are reporting?
- 2.—Of what jurisdiction are you an officer, and what is your office?
- 3.—In this outbreak what was the source of the contagium, or how was the disease introduced into your jurisdiction? (In replying to this question, all means by which the contagium of the disease may be retained or carried, such as by letters from infected persons, infected clothing, beard, hair, breath, etc., should receive consideration, as should also the length of time the clothing or goods had been packed away, the direct or indirect exposure to contagium, etc.)
- 4.—What was the date of the first case?
- 5.—What was the date of the last case?
- 6.—How many cases have there been in your jurisdiction in this outbreak?
- 7.—How many deaths have there been from this disease in your jurisdiction in this outbreak?
- 8.—What measures have been taken for the restriction of the disease?
- 9.—What success have you had in restricting the disease?
- 10.—How many cases are there in your jurisdiction at the present time?
- 11.—In case there was a known direct or indirect exposure to a case of this disease, and no other exposure known, what was the time between the exposure and the first appearance of the disease? (The period of incubation is the time between the exposure and the first appearance of the disease as a result of that exposure.) Please state all facts connected with this outbreak which bear on the "period of incubation" of the disease.

A blank form, with a stamped envelope, is enclosed for your final report. Please retain these until the outbreak is over, and then fill out and send the final report to this office.

Please make special weekly reports, on blanks which I send you, so long as the disease lasts.

Very respectfully,

Secretary.

The first distribution of documents on the restriction and prevention of *diphtheria*, to health officers, members of local boards of health, to correspondents of the Board, physicians, editors, teachers, and other persons interested in the subject, began in October, 1878. The distribution of the revised document to local boards of health in localities where the disease was present, in quantities for them to distribute to citizens interested, began September 30, 1881. With the documents was sent a request for a special report concerning the disease, and the increased distribution of documents tended to increase the number of special reports received. The blank form K (page 83) for special report was first sent out from this office November 29, 1882. The distribution of these blanks was also a means of securing more and better special reports.

The distribution of the document on prevention and restriction of *scarlet fever*, to health officers, correspondents, and others, began in May, 1876. The

distribution of the revised document on this subject, to localities where the disease exists, in quantities to permit the local board to distribute it among persons especially interested, began in December, 1881.

The distribution of the document relative to the prevention and restriction of *small-pox*, in quantity, began in May, 1882.

In order to facilitate and better systematize the reporting of contagious diseases a blank form (L) for notice of first outbreak of a disease, and a blank form (M) for weekly reports during continuance of the disease, and a circular (63) explaining use to be made of these blanks, and the need for them, were printed and sent out in May, 1883, to all health officers, or to presidents of boards of health for which no health officer had been returned. The circular is as follows. It also contains the blanks for notification of outbreak and weekly report during outbreak, and also the blank for final report referred to in the letter to health officers heretofore printed :

RELATIVE TO SPECIAL REPORTS OF COMMUNICABLE DISEASES, BY LOCAL HEALTH OFFICERS, TO THE STATE BOARD OF HEALTH.

[63.] OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH, }
Lansing, Michigan, May, 1883.

To the Officers and Members of Local Boards of Health:

GENTLEMEN :—Whenever your board receives a notice, or in any way gains a knowledge, of a first case, of a disease dangerous to the public health, within your jurisdiction, it seems to be important that you at once communicate with the State Board of Health. Some of the reasons why this is important are:—(1) It will enable the State Board of Health at once to place in your possession any knowledge it has gained which may aid you in restricting the spread of the disease. (2) It will inform the State Board of Health whether it will be necessary to send a warning to boards of health of other localities from which the disease was spread to your locality, or situated so as to be in danger of receiving infection from the case within your jurisdiction. (3) It will enable the State Board of Health to have more complete knowledge of diseases which endanger the public health in this State, and to make and publish each week a more complete statement of the prevalence of any communicable disease in the State, such statements being sometimes of special usefulness to people of the State.

For your convenience in sending such immediate notice to the State Board of Health, a blank form [L] has been devised, as follows:

REPORT OF OUTBREAK OF A DISEASE DANGEROUS TO THE PUBLIC HEALTH.

[L.] To be mailed to the Secretary of the State Board of Health, Lansing, Michigan, immediately on the occurrence of a case of small-pox, diphtheria, scarlet fever, cholera, typhus fever, yellow fever, or other diseases dangerous to the public health.

To the Secretary of the State Board of Health:

SIR:—There has come to my knowledge a case of.....
(Name of Disease.)
in the....., County of.....
(Township, city, or village.)
State of Michigan. The first person sick is.....
....., a.....
(Male or female.)
about.....old, who was taken sick with this disease on the
(Age.)
.....day of....., 188... The number of cases which
(Month.)
have already occurred is.....

The danger of the spreading of the disease from or into the jurisdiction of other boards of health is....., for the reason that.....
(Great, not great, etc.)

Precautionary measures.....
(Will be taken, have been taken, or are suggested to the State

82 STATE BOARD OF HEALTH,—REPORT OF SECRETARY 1883.

..... as follows :
Board of Health, as the case may be.)

.....
(Health Officer, President, or Clerk.)

.....
(Of what township, city, or village.)

..... (Date.) (P. O. Address.)
[Please fill the blank spaces in this notice if possible, but having learned the name of the disease, do not delay sending the report in order to learn other facts provided for in this blank.]

Copies of this blank form are enclosed herewith for your use in reporting outbreaks of communicable diseases, as requested under the law.

WEEKLY REPORTS DURING THE OCCURRENCE OF COMMUNICABLE DISEASES.

In order to secure complete reports of communicable diseases in the State, for the weekly bulletin, and, especially, in order that the State Board shall be regularly informed of the extent of every local outbreak of a disease which endangers the public health within the State, a blank form [M.] has been devised for reports to be made at the close of each week during the continuance of the local outbreak, and mailed immediately to the Secretary of the State Board of Health. This blank will state the jurisdiction and the week for which it is a report, the number of cases of each disease dangerous to the public health there were at date of last preceding report, and the number of cases during the week which were moved into or out of the jurisdiction, the number taken sick, recovered, or died, and remaining sick at the close of the week. This blank is as follows:

WEEKLY REPORT DURING AN OUTBREAK OF A COMMUNICABLE DISEASE.*

[M.]

To the Secretary of the State Board of Health, Lansing, Michigan :

SIR,—The following is a report of all known cases of the diseases named below in the

(Insert the word township, city, or village.)

of....., County of....., (Name of jurisdiction.) (Name of county.)

State of Michigan, during and at the close of the week ending Saturday,, 188..

(Date.)

NAMES OF DISEASES.†	Number sick at last report.	DURING WEEK, NUMBER.					Number sick at close of week.	REMARKS.
		Moved in.	Moved out.	Taken sick.	Recovered	Died.		
Diphtheria.....
Scarlet Fever.....
Small-Pox.....
Typhoid Fever.....
†.....
.....
.....

.....
(Signature.)

.....
(Health Officer or Clerk.)

.....
(Postoffice Address.)

.....
(Date of making this report.)

* The health officer of each township, city, and village in Michigan is respectfully requested to forward a report on this blank to the Secretary of the State Board of Health, Lansing, Michigan, promptly after the close of each week during any portion of which a case of one of the diseases named in this report is present within the jurisdiction of his board.

† Add to this list the name of such a disease as cholera, yellow fever, typhus fever, etc., whenever it occurs.

Copies of this blank are enclosed herewith for use if there is any contagious disease present in your jurisdiction at the present time, or whenever an outbreak may occur. On the receipt at this office of a notice of an outbreak of a disease dangerous to the public health, on blank [L.] or otherwise, copies of blank [M.], for weekly reports of the progress of the disease, will be immediately sent to your locality; copies of documents relating to the restrictive and preventive management of the disease may also be sent, and a circular letter relative to powers and duties of a board of health in connection with the disease reported. This letter will, probably, ask for a special report after the outbreak is over, giving information on the following points: [Questions numbered 1, 2, 3-11, on page 80.]

The following is a copy of the blank form on which such special reports have been requested:

SPECIAL REPORT RELATIVE TO A COMMUNICABLE DISEASE.

[K.] P. O., County, Mich. }
 188.. }

To the Secretary of the State Board of Health, Lansing, Michigan:

DEAR SIR:

1. The disease about which this report is made is.....
 (Name the disease.)
2. The jurisdiction of which I am..... is the
 (Health officer, or clerk, etc.)
 of
 (Township, city, or village.) (Name of township, etc.)
 County, Michigan.
 (Name of county.)
3. The source of contagium, or the mode of introduction of the disease into my jurisdiction, was as follows:.....
 (See remarks concerning this question in the letter.)
4. The first case occurred....., 188..
 (Give date of first case.)
5. The last case occurred....., 188..
 (Give date of last case.)
6. In this outbreak there have been.....cases in my jurisdiction.
 (Number.)
7. From this disease in this outbreak there have been.....deaths in
 (Number.)
 my jurisdiction.
8. The measures which have been taken to restrict the spread of the disease are as follows:.....
 (Describe the methods employed.)
9. The success attending the efforts at restriction was.....
10. At the present time there are.....cases in my jurisdiction.
 (Number.)
11. The following facts bear on the subject of the period of incubation:

Very respectfully,

.....,
 (Name.)

.....,
 (Health Officer, President, or Clerk.)

Of the Board of Health of.....
 (Name of jurisdiction—city, village, or township.)

It is hoped that through the medium of these special reports more knowledge may be gained for publication by the State Board of Health as to the best measures for preventing the spread of contagious diseases.

The hearty cooperation of all local boards of health is earnestly invited.
 By direction of the State Board of Health.

HENRY B. BAKER
 Secretary.

Copies of the documents on restriction and prevention of diphtheria, scar-

let fever, and small-pox, in German and Dutch were also sent when requested by the health officer or other local officer.

In some instances reports of the presence of contagious diseases in localities reached this office before they reached the local authorities, and outbreaks were restricted to the first case by reason of information immediately sent to them from this office.

The large number of replies received in answer to communications in regard to contagious diseases show a wide-spread interest among the people, and a commendable effort on the part of the local health authorities to have every means employed to prevent the spread of contagious diseases. Some of the letters received, and information contained in other letters, have been compiled and abstracted for this article.

DIPHTHERIA IN MICHIGAN—YEAR ENDING SEPTEMBER 30, 1883.

During the last week of the year ending September 30, 1882, diphtheria was reported present in 23 localities in Michigan, the areas of greatest prevalence being in the southern and in the northwestern portion of the Lower Peninsula. It was also reported present at one locality in the Upper Peninsula. Diphtheria is known to have been subsequently carried from some of the localities to others; although in many places it was not permitted to spread. During the year ending September 30, 1883, letters and reports relating to diphtheria were received from 125 localities in the State, being principally answers to letters of inquiry concerning the existence of the disease at those places. Comparing the number of localities at which diphtheria was reported present during the year ending September 30, 1883, with the number for the preceding year, it was considerably less prevalent during the year ending September 30, 1883. During the last week of the year ending September 30, 1883, diphtheria was reported at 20 places in Michigan.

Not including reports from Detroit, about 752 cases and 199 deaths from diphtheria were reported in Michigan during the year ending September 30, 1883. For the year ending September 30, 1882, not including Detroit, 1,477 cases and 368 deaths from diphtheria were reported. This indicates that diphtheria was less prevalent throughout the State in 1883 than 1882. For the year ending September 30, 1883, there were reported 1,494 cases and 344 deaths from diphtheria at Detroit. For the preceding year records of cases were not kept at Detroit, and reports were not received at this office until November 14, 1881, the date of the complete organization of the Detroit board of health; from November 14, 1881, to September 30, 1882, there were reported 569 cases and 129 deaths from diphtheria at Detroit. Adding these numbers for Detroit to those for the rest of the State, there were reported to this office for the year ending September 30, 1883, about 2,246 cases and 543 deaths from diphtheria; and for the preceding year (Detroit not being included from October 1 to November 14, 1881) about 2,046 cases and 495 deaths from diphtheria in Michigan. The numbers for the State, outside of Detroit, are probably not more than one-fourth or one-fifth the actual number of cases and deaths that occurred. If these numbers for the State in 1882 and 1883 (not including Detroit) be multiplied by 5 or 4, and the numbers for Detroit be added, it will appear, as before, that there was less diphtheria in Michigan in the year ending September 30, 1883, than in the preceding year. The maximum for the whole State seems to have been reached in 1883. In Detroit there was more

diphtheria in 1883 than in 1882; whether the maximum was reached in 1883 does not yet appear.*

The per cent of deaths to cases reported outside Detroit in 1882 was about 25; in 1883, about 27. In Detroit the per cent of deaths to cases reported was in 1882 about 22; in 1883, about 25.

The statements in the two preceding paragraphs relate to years ending September 30, 1882 and 1883. The apparent decrease in 1883 was probably a continuation of the decrease which seems to have begun in 1882, one line of evidence of which may be stated as follows: In the calendar year, 1881, the number of deaths returned to the State department as having occurred in Michigan from diphtheria was 2,063; in 1882 it was 1,414, a decrease of 649. The total number of deaths from all causes returned for 1881 was 19,238; for 1882, it was 16,425. The rate of decrease for diphtheria was much greater than for all diseases, being about 31 per cent for diphtheria and only about 15 per cent for all diseases. The deaths returned as from diphtheria in each of the seven years, 1877-82, are stated by counties in a diagram map on following pages.

Diphtheria was reported in 1881 on 34 per cent of the weekly report cards received from health officers of cities and correspondents of the Board; in 1882 it was reported on but 25 per cent.

A part of the apparent decrease of diphtheria in 1882, as compared with 1881, may be due in part to the fact that the disease having prevailed largely during the preceding three or four years, there were not so many persons susceptible to the disease, many being protected by having had it. It may be, too, that the returns to the State department of deaths were not so complete in 1882 as in 1881. But after making allowance for these considerations, it seems probable that no small part of the decrease was due to the more liberal distribution by the State Board of Health of the document giving directions for the restriction and prevention of diphtheria, this distribution having been made possible by the appropriation to the State Board of Health for that purpose (among other purposes) in 1881, the distribution in quantities having begun in October, 1881.*

SOURCES OF CONTAGIUM OF DIPHTHERIA.

To the question, "What is the source of contagium," the reply in most instances was that the desired facts were unobtainable; yet, some were able to give quite positive answers. In one instance the disease was reported to have been introduced into the State from Iowa; in another, from New Jersey; in several cases it was stated to have been transported from large cities in the State as from Detroit and Grand Rapids. A considerable number of the observers ascribed the origin of the outbreaks to peculiarities of location, to filth, and to general unsanitary surroundings. One observer attributed the presence of the disease to too close proximity to a cemetery; and quite a number stated that it made its first appearance in the school-room. In some instances the disease re-appeared in a locality after a subsidence for a considerable time, and no other explanation for its re-appearance could be made than that either previous disinfection had been imperfect, or that there had been no disinfection at all. Dr. A. L. Ambrose wrote concerning the origin of the outbreak in Hanover, Jackson Co., as follows: "As near as I can find out

* Generally throughout the State, the State Board of Health documents on methods of restricting diphtheria have been distributed to families in the vicinity of houses where was a case of diphtheria. The documents of the State Board have been offered to the health officer of Detroit for such distribution; but the Detroit board of health has published a diphtheria circular, and distributed it to families in which was a case of diphtheria. It seems best to distribute documents of instruction how to prevent and restrict the disease to neighbors as well as to the family afflicted.

another family in the house where the outbreak occurred had diphtheria two years before." He also mentions that near the house was a pig-sty, into which refuse from a slaughter-house was commonly thrown. Dr. E. E. Bracy, health officer of Farwell, stated that the cause of an outbreak in that village was the tearing out and repairing a house where two children had died from diphtheria more than three years before. An outbreak in Oxford, Oakland county, was attributed to the transportation of the contagium in clothing from Bay City. An observer in another locality reported diphtheria communicated to a child by books and cards that had been played with by another child who had diphtheria a year previous. Another reported exudative tonsillitis as quite prevalent where, from time to time, malignant diphtheria was manifesting itself. The co-existence of these two diseases at a place shows the possibility of mistaking simple forms of diphtheria for tonsillitis, thereby allowing an outbreak of diphtheria to continue by not taking proper measures for its restriction. Dr. J. Dever, of Hastings, reported as a cause of an outbreak of diphtheria at that place, its communication by a dog that had belonged to a child who had recently died of that disease. Two hundred and thirty-four cases, with 48 deaths, were reported by him as having occurred from July, 1881, to December 13, 1882.

THE DIFFICULTY IN TRACING THE SPREAD OF DIPHTHERIA.

Notwithstanding diphtheria is known to be a communicable disease, many observers fail to trace the origin of first cases, and sometimes of subsequent cases of diphtheria, to any known source of contagium. This has led to a great variety of opinions, causing some persons to doubt the specific character of the disease, and others to believe it specific yet capable of spontaneous generation by unsanitary conditions. The hypothesis of spontaneous generation is not now very popular among scientific men; and there are other ways of interpreting the facts respecting diphtheria which seem to be more in harmony with our general knowledge of natural laws.

Diseases which, as a rule, are communicated only by contact with or close proximity to a person sick with that disease, are when they spread, most easily traced. Thus, for example, measles and whooping-cough are usually communicated by close proximity to a person sick with the disease, and cases of these diseases are usually traced without much difficulty, especially when they are not mild cases which escape observation and yet spread the disease. On the other hand, a disease which is communicable not only by personal contact or close proximity, but also by articles of clothing, books and papers, and the specific cause of which clings to rooms in which one sick with the disease has been, is a disease which is exceedingly liable to be communicated widely, and one which it is exceedingly difficult to trace, because of the impossibility of tracing what is invisible, as is the case with the contagium of diphtheria, at least to the unaided eye. According to the reports which during the past few years have been made to this State Board of Health by many health officers and by other physicians, diphtheria is such a disease as has just been described; consequently it seems very easy to understand how it is possible for a large number of observers to report the details of its mode of spread by the movements of persons or articles known to be infected with the contagium of the disease, and how, under different circumstances, it has been impossible for good observers to trace its spread. There is no necessity for the assumption in any case, that because its mode of spread was not detected, diphtheria was therefore spontaneously generated. And it should be borne in mind that the

reproduction of the disease outside the body, under ordinary temperatures, is as yet hypothetical, no conclusive experiments having as yet been made.

The facts thus far reported seem to show that diphtheria is much more easily spread than is whooping-cough or measles, and that the modes of spread of diphtheria are correspondingly much more difficult to trace.*

RELATION OF DIPHTHERIA TO EXCRETAL FILTH.

The specific cause of diphtheria is probably thrown off in the urine and feces; consequently the excreta thus infected cannot be expected to sustain the same relation to the causation of diphtheria as does ordinary excreta from healthy persons. This may serve to explain the great discrepancies in the reports by those who have reported to this Board, and by observers throughout the world, respecting the apparent causation of diphtheria by filth. If we are ever to learn what relation there is between filth and diphtheria we must first get a well-marked distinction made between excreta or filth known to be infected, and filth which is not known to be thus infected; because if excreta infected with diphtheria are allowed to be filtered into the water which is drank, there is reason to suppose that it will cause diphtheria in all persons susceptible to that disease, and the "filth causation" will then be apparent; and yet that is only one mode of conveying a communicable disease.

Those who report any relation of diphtheria to unsanitary conditions will also place us under great obligations if they will enable us to estimate the comparative sanitary condition of the environment of their patients before and after the occurrence of diphtheria, as well as during its outbreak; also the comparative condition of premises and surroundings of those who did not contract the disease.

PERIOD OF INCUBATION OF DIPHTHERIA.

While in many instances it was impossible to determine the period of incubation, in others it seemed quite apparent. Dr. J. N. Hathaway, of Howard City, stated that nine days after visiting a case of diphtheria he, himself, came down with the disease. Dr. I. Dever observed several cases where the period of incubation was five days. One observer stated that according to his observations the average duration from the time of exposure to the first manifestation of diphtheria was from 8 to 12 days. Another observed that the most common period was 21 days. Dr. A. Mitchell, of Brockway Center, reported one case where from the time of exposure till the throat of the patient commenced to get sore was three days. Dr. L. G. North, of Tecumseh, mentioned a case where a child contracted the disease of its mother, who had been away from home nursing a case of diphtheria. No precautionary measures were adopted to prevent communication of the disease on her return home, and in seven days thereafter the child came down. Such observations serve to strengthen the opinion that the period of incubation of diphtheria is variable, and that, for a considerable time, too much care cannot be taken to prevent communication of the disease by means of clothing, hair, beard, etc., by persons known to have been exposed to the contagium. Dr. O. F. Burroughs mentions an instance where a child came down with diphtheria five or six days after exposure to its mother and a brother, both of whom had been at the asylum for the deaf and dumb at Flint, where there were cases of diphtheria. He also mentions that two ladies who stayed one night with a child who was sick with diphtheria came down with the disease in 48 hours from the time

* Interesting evidence on this subject may be found in Dr. W. L. Worcester's communication, on pages 93-4 of this volume.

they were there. Dr. I. N. Brainerd, of Fenton, mentions that two girls, belonging in a family where there had been diphtheria, went to school after supposed thorough disinfection; five days thereafter one of the pupils came down with the disease. Dr. G. W. Stone, health officer of Metamora, wrote on October 31, 1882, in reply to a letter from this office, in regard to the period of incubation of cases of diphtheria in that village, as follows:

The family had recovered two weeks before the patient was exposed, and after exposure came down in about four days, as near as I can learn. The family that had had diphtheria-claims that after their recovery they put on new clothing and gave the children baths before they let them go out of the house. They were relatives of the case in question, and are not apt to keep any too clean.

Rev. E. H. Day, health officer of Cadillac, reported, December 9, 1882, concerning an outbreak of diphtheria at that place, and of the period of incubation, as follows:

In a family residing here the disease broke out, and in about a week four out of five of the children died. I buried them all. None of the neighbors came near them but one woman, and she only came as far as the fence, perhaps twenty feet from the house, and then only to hand things over the fence. Right after the death of the children *both* families moved away to different parts of the city. About three weeks after, the children of the *second* family were taken, and two out of four died, and I buried them; one of them in the night. None came near them but the physician, myself, and one woman who lived near by. It has been about three weeks since I buried the last child, and this week the woman who was frequently in the house has come down with the disease.

We have one case also of blood poisoning from the same disease. A nurse, who was with me all last winter in that terrible time, sometime last fall went to lay out a child that had died of malignant diphtheria. She had a small sore on one of her fingers, caused by rubbing the skin off in washing. About two or three weeks afterwards the finger became inflamed, and showed unmistakable marks of diphtheria. The utmost skill of the doctor was required to save her life. The sore on her finger has at length been healed over, but she is as yet unable to use the hand but slightly, and her face and body is broken out in red blotches, and she is very feeble.

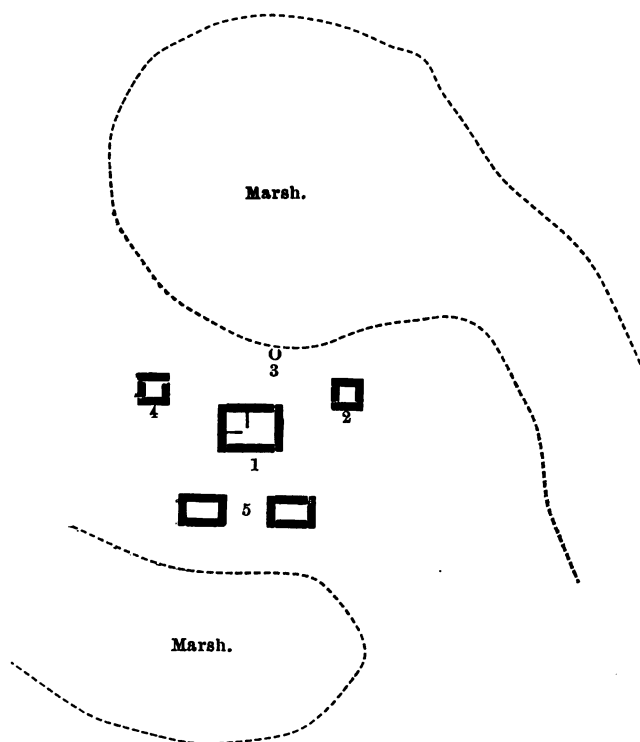
OUTBREAKS OF DIPHTHERIA, AND ACTION OF LOCAL HEALTH AUTHORITIES TO RESTRICT IT.

In reply to a letter from this office concerning the occurrence of diphtheria among immigrants at L'Anse, Dr. J. G. Turner wrote August 31, 1882, as follows:

After making all inquiry possible I can find no history of diphtheria having existed on board the ship on which the immigrants came, which was the Celtic, of the White Star Line. The name of the man is Nelson Victor and of his wife Hanna Victor; they arrived in New York May 28th, reaching L'Anse June 3d. Referring to my case-book I find that on the 15th of June I was called to the family of Peter H., and found three children in one bed suffering with diphtheria of a most malignant form, one child being already dead at the time of my arrival, who they told me had been sick for a week with sore throat, high fever, having been taken sick suddenly at school, having to be brought home, and, as they stated, choked to death that morning. Two of the three children already sick died within the next thirty-six hours; and thus the disease ran on until the mother and nine children had been attacked, five of whom succumbed. The mother recovered. The four children were convalescing nicely, when they were taken down with measles, which at that time was prevalent in the community, two of them dying with croup appearing at the usual time. I made a most thorough examination as regards the water-supply, drainage, etc.; could find no animal or vegetable matter in a state of decomposition, and could find nothing to account for the outbreak save the generally filthy condition in which the Swedes live. There was only one other case beside this family, which was directly traceable to contact. It is scarcely necessary to state that a rigid quarantine was enforced, and the whole premises thoroughly disinfected immediately upon my first visit. The locality in which the outbreak occurred is a small hamlet of about one hundred persons, so isolated that they are scarcely ever brought into contact with persons from outside at all, and usually remarkably healthy, this being the first sickness of any importance occurring there within the past five years.

Radical measures for preventing the spread of diphtheria after an outbreak in the township of Rich, Lapeer county, are described in a letter from Dr. H. McCall, of Lapeer, dated December 26, as follows:

Last week Mr. McIntyre of the town of Rich, this county, gave me a short account of a malignant outbreak of diphtheria in his town, and also made the rough drawing below:

Premises Where Occurred Malignant Cases of Diphtheria.

1, house; 2, pigpen; 3, well; 4, privy; 5, stables.

First case was on August 27, and the last on September 10. The house was on a small rise of ground near the marsh; the well at edge of marsh—privy and pig-pen draining to the well. There were 9 cases altogether, with four deaths in the family, or rather in the two families, ages 6 to 10 years. They were removed and the house with contents burned to the ground, securing certain disinfection by such radical methods. The family were removed to another place. The matter came up by the town board of health applying to the board of supervisors for pay to the owner of the house.

Geo. A. Love, clerk of the board of health of Grand Rapids, reported 254 cases of diphtheria, and 58 deaths, for the year ending December 30, 1882.

The reports from Grand Rapids show that for the year ending September 30, 1882, there were in that city 301 cases and 72 deaths caused by diphtheria; and for the year ending September 30, 1883, from the same disease, 185 cases and 29 deaths.

Dr. Niles, of Calumet, wrote October 16, 1882, that 39 cases of diphtheria had already occurred in the outbreak at that place, there being five mild cases under treatment at that date. (According to a letter from Dr. Niles, written in September, 1882, and printed on page 381 of the Annual Report of the State Board of Health for 1882, the local board at Calumet had taken very active measures to stamp out the disease.) No reports were received after October 16, 1882.

Dr. James Mulhern wrote October 26, 1882, in regard to the speedy subjugation of an outbreak of diphtheria at Greenville as follows:

The epidemic of diphtheria, which broke out in the city of Greenville about the middle of Sep-

tember, seems to have entirely subsided. The original source of contagion is unknown. The entire number of cases was eight; the number of deaths, four. The measures used to restrict the disease were isolation and sulphur fumigation.

Dr. F. B. Florentine, of Saginaw, wrote October 28, 1882: "We have one case of diphtheria at present, the first case for quite awhile. The patient, aged 25, was doing quite well. Am taking all precaution possible to keep it from spreading." November 4, Dr. Florentine wrote as follows:

No new case of diphtheria has developed as yet, that has come to my knowledge, since the case that I reported to you about a week ago, and I do not know anything about the contagious cause of said case. Subject lives in a comfortable house and in a healthy location, and says that he has not been exposed by being where there was any case of diphtheria or even where there has been recently.

November 20 Dr. Florentine reported three new cases of diphtheria, with one death. On December 28 he wrote that there were no more cases.

Dr. J. Camp, health officer of Bangor, reported an outbreak of diphtheria November 15, 1882, as follows:

Eight cases of diphtheria during the last twenty days have occurred here, all of a mild type except one, which resulted in a diphtheritic croup (membranous), and recovered. The eight cases were in five different houses. All are now either well or convalescent. Three of the houses were on the north side of the Black river and two on the south side, 80 or 100 rods apart. On each side of the water the houses were near each other, and the disease seemed to travel from one to the other during the first week or ten days. Our preventive efforts were in the direction of prompt and efficient treatment, and keeping the patients confined to the houses in which they were taken sick till pronounced well—together with usual mode of disinfecting rooms, clothing, and bedding, etc. To-day I consider Bangor free from diphtheria. I can give no reason why we had diphtheria. Nothing unusual could be observed in the surroundings of any of the houses, and the country all around has been unusually free from diseases of any kind, except this, for a long time.

The disease continued at Bangor until about the first of December, 1882. No further reports concerning its presence at that place were received at this office until the month of September, 1883.

Dr. A. A. Thompson, health officer of Flint, wrote November 19, 1882, relative to the great susceptibility of the deaf and dumb to diphtheria, and in relation to diphtheria in the State Institution for the Deaf and Dumb, as follows:

We have had about fifty cases of measles at the Deaf and Dumb Institution. After the measles began to subside symptoms of diphtheria showed themselves in some of the convalescents, and since then in one or two children who had not had measles. The vitality of a deaf and dumb child is below par and the glands of the throat are enlarged at their best. Most of these children become dumb as the result of scarlet fever, cerebro-spinal meningitis, or some other disease which comes near proving fatal, and I find almost without exception a chronic inflammation and enlargement of all the glands of the throat and a low state of vital power. It is the best soil in the world for diphtheria to flourish in. The institution is heated with steam-coils, and it seems to me that this makes an atmosphere very favorable to the propagation of germs or bacteria.

We have had two deaths from measles and three from diphtheria, or perhaps two of these last should be considered as from the result of both measles and diphtheria combined. They were convalescent from measles when attacked with diphtheria.

There is one new case of measles this morning, and there are at present four cases of diphtheria, three of which appear mild at present and one very severe. Of course we are taking the greatest of pains to isolate the cases and making a free use of disinfectants. The institution is quarantined both as to the city and the State. Parents, however, whose children are well at present are many of them clamoring to take their children home, but for the most part we have succeeded in keeping them from doing so. However, if it comes to a peremptory demand on their part in the case of a child which shows no symptoms of either disease, I do not suppose we can hold them.

It would be better for the institution if these convalescent measles patients could be sent to their homes, and also better for the patients themselves.

I have been notified this morning by a physician that a mother living in the second ward of this city who went several days ago to the institution to see her daughter, is now down with both measles and diphtheria. She is said to be 33 years of age. I have not had the time to see and investigate yet.

I do not know that there is anything wrong with the sanitary condition of things at the institution. Everything looks all right, and nothing but an examination by experts would be of any use.

But one thing is sure, viz., that the throat of a deaf and dumb child is the best soil in the world for the development of diphtheria, and especially after measles.

December 4, 1882, Dr. Thompson wrote as follows:

In spending so much time with diphtheria patients at the institution I got thoroughly poisoned with it myself, giving up with it on Thursday, November 23d. Had a very characteristic attack and am just out again. The epidemic is over now,—old ones all convalescent, and no new cases. Measles will spread a little in spite of all efforts to quarantine.

Dr. E. P. Thomas reported, December 4, 1882, the introduction of diphtheria into Scottsville, Mason county, from Ludington. There were 35 cases, and 6 deaths, from October 25, 1882, to November 28, 1882. The plan of isolating was vigorously executed, and the dwellings where the cases occurred were quarantined. December 4, 1882, there were no more cases to report.

Dr. W. H. Rouse wrote December 4, 1882, relative to diphtheria at Detroit, and his observations as to its contagiousness, as follows:

Diphtheria seems to be distributed all over the city, but more especially in the eastern portion, a part in which diseases of all kinds are usually most prevalent, due possibly to the houses being poorer and much closer together, and other unsanitary conditions usually associated with these conditions. There are about 100 cases of diphtheria here, but no place seems especially afflicted.

Diphtheria as it prevails here does not seem particularly contagious. At times it affects all the members of a family, as is not unusual with all diseases. In a great number of cases only one is afflicted, and the source of contagion can seldom be discovered. I have repeatedly asked physicians who are treating these cases if they can find any reliable indications of contagiousness in regard to this disease. The most careful observers are not clear that the disease really is contagious, and, although authority is very strong in favor of contagion, I am inclined to doubt its existence in the cases observed here.

I have carefully observed its course, and by frequent inquiries of the members of our county Medical Society tried to learn all that is available in regard to the contagiousness of this ailment. I have the information published by the State Board. If you can afford any new light from observers in the State it will be thankfully accepted.

Dr. O. F. Burroughs wrote December 15, 1882, in reply to a communication from this office, concerning the introduction and spread of diphtheria at Galesburg, Kalamazoo county, as follows:

The 18th of November I was called to see a child, four years old, at Thos. B. Lord's, four miles west of this village, in the township of Comstock; found the child sick with diphtheria. The mother, with this child and one two years older, had two or three weeks before come from Iowa on a visit to the mother's parents. I found that ten or twelve days before the older child had been sick with sore throat. After prescribing for the child, and giving them necessary instructions in regard to keeping the child isolated from other children, I left, to be sent for if needed. The child was better in a day or two, and it was not necessary for me to see it again. No other cases of diphtheria in that locality as far as I could ascertain.

The next family I was called to see with diphtheria was Geo. Toby's, in the township of Charlestown, on November 23d, about three miles east of this village, making the distance from the first case to this place nearly seven miles. Here I found a little girl four years old that had been sick two days with diphtheria of a malignant type, the parents being ignorant of the disease. The mother had five or six days before the child was taken sick returned from Flint, where she had been to see her mute son who had just recovered from measles. She informed me that they told her they were having some cases of diphtheria in the asylum, and some had died. She became frightened and brought her son home with her, against the wishes of the professors. After prescribing for the child, and giving them the necessary instructions for isolating this child from the rest of the children, which consisted of a brother two years old, a sister six years old, and the mute son brought from Flint (this child was very sick), I left, with an appointment to see the child the next day. I also ordered them to notify the township clerk, and to keep the children of the neighborhood away from the house, and to burn up all pieces of cloths used around the child. The next day found the child worse, and I requested counsel. Dr. Bove, of Augusta, was called and saw the case with me. She got no better, but grew worse, and died on the fifth day of her illness.

Two of the ladies of the vicinity who stayed with this child one night were taken with diphtheria in 48 hours from the time they were there.

The second child was taken sick with diphtheria about the fourth day from the attack of the first. This was a girl, and two years older than the first. This child, like the other, was isolated from the others in a room by herself. The sixth day of her illness she seemed to be getting better, the swelling seemed to be subsiding, and the false membrane growing less. On the morning of the eighth day I noticed that she was coughing croupy, and was satisfied that diphtheritic croup had

supervened; the false membrane extending well down into the trachea. She continued to grow worse for 48 hours and died.

These two cases were buried without making a public funeral.

The two ladies taken with diphtheria, after taking care of the first child, were not very sick, and soon recovered. I did not see them.

No more of this family were taken sick with diphtheria.

The third family taken with diphtheria lived a mile south of this village. The family consisted of father and mother and seven children. I was called November 23, and found two children, one sixteen and the other nine years old. They had been sick two days when I was called. Could not trace it to any particular cause. One week from the time the first two were taken the other five children and the mother were taken with the disease; and a day or two after, the father was taken with the same disease, but they all made a good recovery.

I have heard of other cases of sore throat, but not severe enough to call a physician, to my knowledge. The disease commenced in these three places about the same time, about three or four miles apart.

It is possible that the first child that I saw took it from its brother older, and the brother on the cars coming from Iowa. The Toby children might have contracted the disease from the mute boy taken home from Flint. The third family that had diphtheria I am unable to trace to any reasonable source.

January 20, 1883, Dr. Barroughs wrote that there were no more cases at Galesburg, and that there had been no more deaths.

N. T. Chaffee, health officer of the township of Dover, Lenawee county, reported, January 15, 1883, four cases of diphtheria, the disease having been communicated from the asylum at Flint.

E. J. Ross, health officer of Rome reported, February 5, 1883, cases of diphtheria contracted from those in Dover mentioned by Dr. Chaffee.

Dr. G. G. Gordon, health officer of Gaines township, wrote, February 26, 1883, as follows:

I was at Gaines's Station, on Tuesday, the 20th, to see some cases of diphtheria. I visited the cases with Drs. Marshall and Austin, who have them in charge. Dr. Austin, who is health officer for the village, had taken prompt action to confine the disease to this one family, and I think with success, as I learn of no spread of it as yet. In all he has done he has been well and ably assisted by Dr. Marshall.

The family had consisted of the father, mother, and five children. One child died Sunday, the 18th, one the night of the 20th, and one since then, but I can't give dates, nor have I heard from them since Saturday morning. They are very poor and the hygienic conditions not very favorable. The house stands on the side of a hill in south part of village. Well-water obtained from well on hill, 22 feet deep, upper 10 feet of wall being laid in water lime. Privy vault about 30 feet from well. Several families use water from the same well which has furnished plenty during the past dry spell. Could not trace any source of contagion.

Diphtheria has been reported since in the township, but I have not been to see about it. A report said cases were isolated and I have been ill myself. Shall see to it to-day.

Dr. Thomas U. Flanner, health officer of Quincy township, wrote, March 19, 1883, concerning an outbreak of diphtheria: "A woman from a family in an adjoining village (Hancock) in which family the disease was existing, and in which there had been at least one death, visited a family in my jurisdiction and remained some time. This was on Friday, February 23, 1883." The first case in his jurisdiction occurred February 26, 1883. As to measures adopted to restrict the spread of the disease he wrote that they consisted of: "The cordial coöperation of the board of health in securing immediate, perfect, and entire isolation; free use of disinfectants; immediate burning of everything containing secretions, immediate and private burial of those dying, after disinfecting bodies. In fact, all the measures recommended in pamphlet of State Board on Restriction and Prevention of Diphtheria, were carried out." April 26, 1883, Dr. Flanner wrote: "I am glad to be able to say that owing to the prompt measures taken for its restriction, we have no further cases of diphtheria, it having been confined entirely to the family in which it originated."

Dr. John S. Caulkins, of Thornville, reported diphtheria under date of March 21, 1883, as follows:

Will you have the kindness to send me a good lot of the documents relating to the restriction of diphtheria? Cases of the disease are occurring in different directions all around us, and a few in my own township. There were two fatal ones over the line, in Addison, about three weeks since. They were attended by two Almont physicians, one of whom called his case "membranous croup," and the other called his diphtheria. It is generally believed that they were both diphtheria. Some good authorities hold that it is all one thing, but I cannot say that I am convinced yet that they are right. There are two cases in our township that are said to be severe, and considerable alarm is felt in the neighborhood, which I call a good sign. A few years ago no one would believe that diphtheria was contagious. This groundwork for a false security is now fast disappearing. This is all, or nearly so, owing to what the State Board of Health have done toward it. Of course the press, medical and secular, have done something, but the Board have been the main agency in making the change in public opinion.

Dr. L. G. North, of Tecumseh, in a report sent April 1, 1883, tersely describes successful efforts to restrict an outbreak of diphtheria to one family, where there were five cases and three deaths, as follows: "Strict quarantine; no funerals were held; coffin taken to house in hearse by undertaker; body put into it by him and at once taken to the grave; persons at grave: sexton, undertaker, and hearse-driver only. Undertaker washed and fumigated before meeting his family. Provisions left at gate by neighbors; no one visited them except physician, health officer, and undertaker."

Dr. I. N. Brainerd of Fenton, wrote, April 2, 1883, as follows:

The history of diphtheria here is this: One girl had what was diagnosed as "sore throat." The girl who cared for her soon became ill. The same doctor diagnosed "quinzy." She died in two days. The first recovered. The woman who washed the clothes of number one was taken with diphtheria. It is now believed that all three had diphtheria.

On another line, and other cases, diphtheria was brought from Detroit. Patient died. Four others in family had it; one died. Three weeks later two girls from that family came to school, after careful disinfection. Five days later another girl came down with diphtheria. This was a student. The attending physician thinks that she got it at school. I think it was *de novo*. The mother of the last named girl is down with it. All the cases are out of my jurisdiction.

Dr. W. L. Worcester, of the Michigan Asylum for the Insane at Kalamazoo, wrote April 14, 1883, respecting diphtheria, measles, and scarlet fever at Michigan Asylum for the Insane, and the different modes of spreading these diseases, as follows:

There have been several cases of measles in the asylum this winter and spring, and a comparison of the spread of that disease with the epidemic of diphtheria may be of some interest.*

A girl employed in the laundry visited a neighboring town on Christmas day in company with a sister who does not live at the asylum; both were attacked with Measles January 8th. Another girl employed in the laundry was attacked January 21st, and a third February 4th. All three roomed in the centre building at the female department.† No other cases have occurred there. They were treated in their own rooms, and no precautions against the spread of the disease were taken beyond keeping unprotected persons away from them after the nature of the cases was recognized.

An attendant employed on hall "G" at the male department‡ was attacked March 17th. On the 30th an attendant and one patient on the same hall were attacked, and on the 31st another patient. One of the above patients was transferred before the disease appeared to hall "H."† A patient on that hall showed the first symptoms on the 13th inst., and is at present going through a regular attack.

About April 1st a nurse girl employed in the centre building of the male department came down with measles, supposed to have been contracted in town. The child for whom she cared, and a kitchen-employee living on the same floor, have just manifested the characteristic eruption.

In all the above cases the exposure took place before the disease was recognized. The differences in the manner of extension in these cases and in the epidemic of diphtheria are too obvious to require comment.

One case of scarlatina occurred in the person of a servant girl at the female department. Simul-

*[A report by Dr. Worcester of diphtheria in the asylum is printed on pages 344-55 of the Report of the State Board of Health for the year 1882.]

† [Diagrams of these departments are on pp. 347-351 of the S. B. of H. Report for 1882.]

taneously with the appearance of the rash a well-developed diphtheria patch appeared on the left tonsil, followed shortly after by the formation of membrane on the other tonsil. She was isolated and the room fumigated after she went home, where her illness was doubtless contracted. No other cases have occurred.

Cases of sore-throat, similar in all respects to those I mentioned as occurring during the prevalence of diphtheria, have been quite numerous during the past three months. At present there seems to be an epidemic influenza.

With the above exceptions there have been no prevailing disorders, and while there has been the usual amount of sickness and death, the mortality has been mainly from chronic disease. From pneumonia, which caused a larger mortality than any other disease in the winter and spring of 1881-2, we have only had one death.

The above are all the points which occur to me as likely to be of interest in regard to the health of this institution during the past six months.

April 19, 1883, Dr. Worcester wrote, in reply to a letter from this office, as follows:

The following are in brief the points of difference in the manner of extension of diphtheria and measles here to which I referred:

1. No case of measles has originated here in which there was not a well ascertained history of personal association with some person suffering from the disease. The contrary was the case with the majority of the earlier cases, at least of diphtheria.

2. In every case of measles there was a well-defined period of incubation of from twelve to fourteen days. Nothing of the sort was observed in those cases of diphtheria in which there was a history of previous exposure to contagion.

3. If what I infer to be your views, that a considerable proportion of our cases of diphtheria were due to mediate contagion, by means of physicians and others who had come in contact with the sick, be correct, this would constitute another important point of difference, as no case of measles of this kind has occurred, although no precautions whatever were taken against it.

From these circumstances it seems to me reasonable to infer that if diphtheria is disseminated by contagion, the mode of its dissemination is different from that of measles, and that the precautionary measures requisite in the one case would be inapplicable to the other—not an unimportant matter in a practical point of view. If we do not know just where the enemy is, it is something gained to know where he is not. It is not necessary, for instance, to take the same measures against the spread of syphilis and small-pox, though both are contagious diseases. Granting the contagiousness of diphtheria, and the propriety, while our ignorance lasts, of guarding all possible avenues of its extension, it is still highly desirable to know the precise method by which it is communicated, and to direct our efforts for confining it where they are really needed.

Dr. John R. Williams of White Pigeon wrote, July 13, 1883, of an outbreak of diphtheria, and its possible origin, as follows:

Diphtheria has again broken out in this township; three cases have been reported to me and one death. The cases are all in the country. I can assign no cause for the outbreak at this time. Nearly two years ago this disease broke out in the town of White Pigeon; some fifty-four cases were reported, resulting in fourteen deaths. Among the cases reported at that time was a family by the name of Wade. In this family there were five cases (all the children) and three deaths reported. All treated by different physicians. These were the first cases reported. I attempted to investigate the cause, and came to the conclusion that as the building in which this family resided had been used some years before by a man dealing in poultry, who dressed the turkeys, chickens, rabbits, etc., in the building, and the season of the year (November) being very damp, had caused gases to arise from the decomposed material.

Dr. Geo. A. Harding, health officer of the village of Sault Ste. Marie, in a letter dated July 31, 1883, wrote of diphtheria:

Diphtheria has been present more or less since the summer of 1881. It raged in the township and village severely during the past winter, and nearly died out this spring, but is being revived again now. We are taking all the precaution possible now against its spread, but have to work against an ignorant class of people, who have to be told *again* and *again* and forced to take precautionary measures before they will obey. A number of deaths, however, have made them more docile, and we hope to be able to do more with them in the future; at all events *we shall keep at work*.

Dr. Henry M. Hurd, medical superintendent of the Eastern Asylum for the Insane, in reply to a letter of inquiry from this office, wrote September 21, 1883, relative to an outbreak of diphtheria at that institution, as follows:

~~Seven cases of diphtheria have occurred in the Eastern Michigan Asylum during the past five months.~~

Case 1. An attendant in the hall designated as "3" and in the room so marked on the accompanying diagram was attacked April 23 [20*]. The hall is small; is one composed exclusively of single-bedded rooms, with the exception of one dormitory containing three beds, and was not overcrowded. The sanitary conditions of the building had been regarded excellent. The condition and ventilation of the attendants' sleeping rooms were good. The attendant could not trace his attack to contagion, nor could any be discovered after the most careful inquiry. He had been many months in the asylum, and when off duty had not visited in any family where there had been sickness. Although not in robust health, he had been able to do his work.

Case 2. The second case occurred May 4 in an adjoining hall, and in the room marked "2" in the accompanying diagram. He was an attendant of nervous constitution, and somewhat delicate bodily health. Case 1 had been removed to this hall and placed in the room designated "x" just preceding the outbreak of the disease in case 2. He could not have carried contagion with him, however, as there was not the slightest trace of membrane in his throat; he had received a full bath, sponging with alcohol, and a change of clothing immediately preceding his transfer; besides, case 2 saw the patient but once, and then barely a moment.

Case 3. The third case occurred May 20, on the female side of the house in a hall remote from those in which the preceding cases developed. The hall was located on the third floor, was somewhat overcrowded, and occupied by a demented class of patients. The room in which the patient was attacked, and afterwards isolated, corresponds to the one marked 16 on the diagram. The usual precautions were taken to disinfect discharges, bed-clothing, and the like, and on her coming out of the room it was thoroughly fumigated. This case occurred in May, and there has been none in the same hall since. It is also proper to add that the patient had not been exposed directly or indirectly to contagion. She went out but little.

Case 4. The fourth case, a patient on hall three, was attacked on June 4. Case 1 was also in this hall for a few days in the latter part of the preceding April.

Case 5. June 17. The fifth case occurred in a patient who had been brought from jail in an adjoining county. This person had been in the institution but ten days, and had not been associated with either of the sick attendants, nor had anyone engaged in caring for them cared for him. The case occurred in the first hall on the second floor in the male department, in a room corresponding to the one designated "4" on the diagram. No subsequent cases have occurred in this hall, although, owing to the fact that his friends visited him almost daily, isolation was necessarily less complete than in the preceding cases.

From the time of the recovery of case 5 in June until August 16, the institution was free from the disease.

Case 6. August 16. On this date an attendant in hall 2 was taken sick. He had not been exposed to contagion, but had occupied room 2. He was isolated in a room in this hall marked Y, and was attended by a special nurse. He was very ill for a number of weeks, and has barely recovered from diphtheritic paralysis.

Case 7. August 20. The seventh case occurred almost immediately after case 6. He had slept with case 6 from August 11 until August 14; after this date with a healthy attendant in the room marked "z." He was a feeble, neurotic boy, very hypochondriacal and apprehensive of death; which event occurred after an illness of about two weeks. This was the only fatal case.

The above comprises the history of the epidemic, if such it may be called, in this institution. The means taken in every instance to prevent the spread of the disease were prompt isolation of the patient, disinfection of bed-clothing, towels, etc., by a zinc and salt solution; disinfection of the dejecta by copperas solution. Each room used for the treatment of a case was, on its termination, thoroughly scrubbed and fumigated with sulphur. In some instances oiling of the floors and painting of the wood-work were resorted to.

It seems well settled from the above that:

First. The outbreak of diphtheria could not be traced to any outside source of contagion.

Second. No fault in the sanitary arrangements of hall 3, where the disease originated, could be detected. The hall was not crowded, and all the patients were in good bodily health.

Third. The attack in the second patient had a very remote connection with the first, if any.

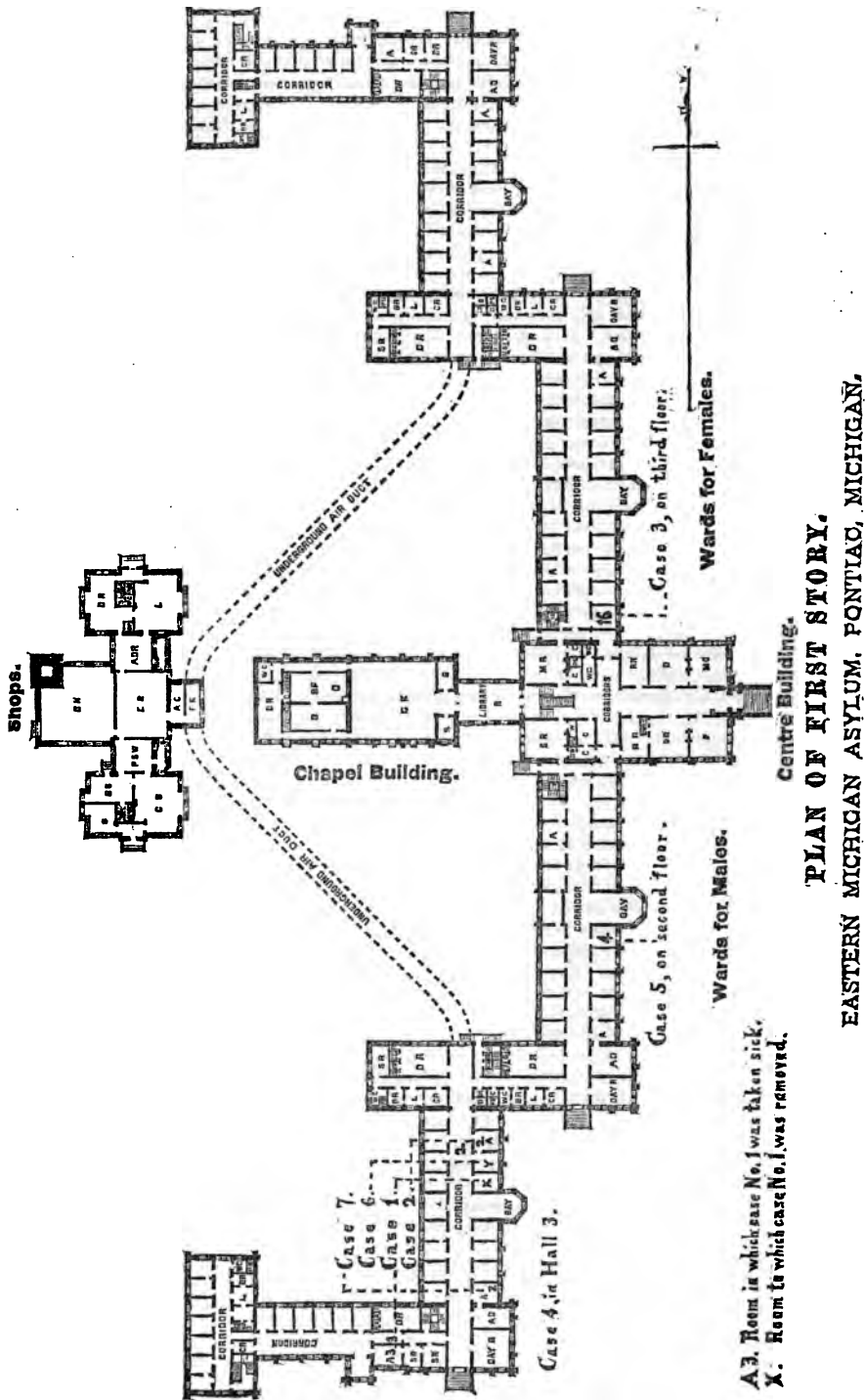
Fourth. The third case occurred in a wholly different portion of the building, and there was no possibility of contagion from the preceding cases.

Fifth. The fourth case could not be traced to any contagion.

Sixth. The fifth case was not in any way connected with the others.

Seventh. The lateness of the attack in cases 6 and 7 seems to argue an independent origin for these.

* [April 20, according to a second letter from Dr. Hurd, on page 97, which also gives additional statements with regard to this case.]



A second letter of inquiry was sent from this office to Dr. Hurd, September 22, 1883, and was as follows:

Please accept very cordial thanks for your careful report of the recent outbreak of diphtheria under your observation. Careful records of such outbreaks are very important contributions to a knowledge of the causes of, and the means for the prevention of diphtheria. I would be glad to get a little additional information with regard to a few points, as follows:

1. What is the name of the physician who attended case 1?
2. In what halls was he on duty at the time he was attending case 1?
3. Case 2 occurred May 4, in room "A 2," hall 12, just after case 1 was removed to a room in that hall, and case 2 had seen case 1. As bearing on the period of incubation, please state how many days elapsed between the known exposure and the occurrence of the disease in case 2.
4. Concerning case 2 you say: "He could not have carried contagion with him, however, as there was not the slightest trace of membrane in his throat," etc., implying a belief that the patient could not himself communicate the disease unless he had a membrane in his throat. As his removal was less than eleven days after his attack, I would be glad to know if you really hold this view,—that he "*could not*" still have contained the contagium of the disease, or whether you would like to qualify what you have written.
5. Will you have the kindness to state the name of the physician who was on duty in the hall No. 1 (?), on the third floor, female side, about the time case 3 occurred in that hall, May 20?
6. With respect to case 3, you say: "The patient *had not been exposed* directly or *indirectly* to contagion." I suppose this means that there was no *known* exposure. Because, where diphtheria occurs in an institution of this kind, in which the inmates are chiefly adults who usually have diphtheria in a mild and greatly modified form, such exposures might easily occur without being detected. Under these circumstances, would it not be almost impossible to determine whether or not there had been such an exposure?
7. Had the physician, in charge of the hall in which case 3 occurred, seen case 1 or case 2 before case 3 occurred?
8. Will you have the kindness to state what room on hall 3, case 4 occupied previous to coming down with the disease?
9. Were the discharges from case 1 disinfected?
10. Did the discharges go into the water-closet on that hall?
11. On the plan sent, you have numbered in red ink *two rooms*, "A 2," in one of which was case 2, and in one of which was case 6, who was isolated in room marked in red ink "Y;" were case 2 and case 6 in the same room? If not, in which room was case 6?
12. Did the same physician treat cases 1, 2, 4, 5, 6, and 7.
13. Was the physician who treated case 1 on duty in the halls in which each of the succeeding cases occurred?
14. With reference to the third case you say: "There was no *possibility* of contagion from the preceding cases." Considering the exceeding difficulty of tracing the movements of an invisible contagium, do you wish to modify that statement?
15. During the time covered by this outbreak were there in your institution other cases of sore throat which could not be positively identified as diphtheria? If so, about how many cases can you learn of there having been?

Institutions like yours, under the careful management of medical men offer excellent and about the only opportunities for gaining a knowledge of the characteristics of diphtheria among adults, as distinguished from its usual behavior among children, and among people of all ages in a general population.

To this letter Dr. Hurd replied, September 24, 1883:

1. Dr. C. B. Burr attended case one.
2. He also visited all the other halls on the first floor (including one in the new extension not shown on the diagram) as well as the corresponding four halls on the second floor.
3. I am in receipt of a letter from Mr. D. (case 1), which enables me to correct certain dates. It seems he took to bed April 20, not 23, and had felt bad one day previous to that time. He was sick on hall 3 thirteen days; being removed to hall 2, May 3. In regard to the second part of your interrogatory it is not conceded that exposure of case 2 occurred from case 1, and it seems less likely in view of the facts just written. Case 2 did not see case 1 until after he came to hall 2, and was taken sick the following day.
4. The correction made in dates above, enables me to reaffirm with great positiveness that it is in the highest degree improbable that case 1 carried any contagion to hall 2.
5. Dr. Emma L. Randall visited regularly all patients on the third floor of the female side up to the time the diphtheria case occurred. During the progress of this case, Dr. Burr took charge of it inasmuch as he had the previous cases under treatment.
6. It is still held that case 3 must have arisen independently of contagion. The constant

supervision to which patients of this class are subjected removes any doubt of the absence of contagion in the case.

7. Dr. Randall did not see cases 1 and 2 at all. Dr. Burr while treating these cases did not visit the female side until he did so to treat case 3.

8. Previous to coming down, case 4 occupied the room in which he was subsequently isolated.

9. The discharges in every case were thoroughly disinfected.

10. The discharges were thrown into the water-closet on the hall after being so disinfected.

11. Rooms X, Y, and Z adjoin each other. Cases 2 and 6 were both attacked in room Z, the one in May, the other in August.

It should be added that case 2 was at once removed to a remote hall not figured in the diagram and in which no case has ever occurred. Case 2 was accordingly in hall 2 but about twenty-four hours after the disease developed. The room in which case 7 was isolated was "Z." It is on the same hall but remote from X, Y, and Z.

12. Dr. Burr treated all the cases in the house not excepting the one which occurred on the female side. Dr. Christian frequently saw the cases and during Dr. Burr's absence for four days in May, had charge of cases 1 and 2; the former of which had long since passed the acute stage.

13. Dr. Burr was on duty on the halls on which the succeeding cases occurred, with the exception of case 3. No case occurred on the upper tier of the male side (Dr. Christian's halls) although as stated, he frequently saw the cases with Dr. Burr.

14. I have no desire to modify the statement made respecting case 3, that "There was no possibility of contagion from the preceding cases."

15. Many cases of sore throat occurred during the time diphtheria was prevalent. There was no case which could not positively be identified after the lapse of twenty-four hours. A suspicious case in its incipency and until fully developed was treated as one of diphtheria, every precaution being employed.

Dr. A. S. Martin, health officer of Texas, Kalamazoo county, wrote, January 16, 1884, in regard to diphtheria in that township, in 1883, as follows:

During the month of January, 1883, Mr. and Mrs. H., living in the southwest part of this township, paid a visit to friends in Barry county. Shortly after returning Mr. H. came down with diphtheria. In the course of three or four weeks his wife was taken with the same disease. Mr. H. could give no account as to how he became infected.

On the first of August following a little son of Mr. H. K., living in the northeast corner of this township, came down with diphtheria, and on the 5th of August the child died and was buried on the same day. No cause could be assigned for this outbreak. The child had been constantly at home, with the exception that about two weeks previous he had rode to Kalamazoo with his father, but did not stay but a short time. It is certain there was no connection with this case and that of Mr. or Mrs. H. Yet we can not believe in cases of sporadic diphtheria as occurring as often as we hear about. Just one week from the time the little boy of Mrs. K. was buried I was called into a house in Portage township, situated about eighty rods from the house of Mr. K. The lady remarked as I entered that baby had a very peculiar-looking sore under its arm. On examination I found an abrasion near the left axilla, literally filled with diphtheritic membrane. Careful inspection of the throat showed no lesion in that region. Treatment was given and the mother was advised to call some other physician and have the treatment continued, as the case should demand. I left the following morning for an extended trip in the eastern part of the State. On my return I learned that the day after I left another member of the family, a little girl, was taken with diphtheria and died. The father was taken with the same disease, but recovered. The baby was sent away from home, but finally died (with the cholera infantum it was said). After the family recovered the house was cleansed, and word was given out that the house had been disinfected.

After this Mrs. W., a lady residing in this township, accompanied by her two little children, paid a visit to the afflicted family in Portage (this was on Saturday). On the following Monday Mrs. W.'s little boy Bertie, was taken with diphtheria and died. The other child, a girl, was taken in a few days, and also died. Mrs. W. took the disease, but finally recovered. Mr. W., the father, and three children, one a nursing baby, escaped the infection.

Two weeks after the death of Mr. and Mrs. W.'s children, I returned, had their house disinfected, gave the family a certificate of health at the proper time, and no further cases have occurred up to the present writing.

Here let me say that the carpet in the infected house in Portage was not taken up at the time the house was disinfected. But after the death of the children at Mr. and Mrs. W.'s, the carpet in the house in Portage was taken up and cleaned. Can it be possible that the Whipple children were infected in any other way except by that carpet?

At the time I examined the baby at the Portage house, inquiries were made in regard to the source of infection in that case. The lady informed me that when Mr. K.'s child was taken Mr. K. came to her house for mustard, but did not enter. She met him at the door with the child in her arms

NECESSITY FOR COÖPERATION OF CITIZENS.

The necessity for prompt notice to the local board of health of every case of diphtheria, and the difficulty of restricting the disease where such notice is not given, and physicians teach that diphtheria is not contagious, are well set forth in the following letter, dated January 1, 1883, from Edwin Allen, health officer of Sherman township, Isabella county. In reply to this communication it was recommended to distribute the State Board of Health document on the restriction of diphtheria, and 25 copies were sent for distribution.

You will notice in my annual report that the physician's report to me was always detained until the cases were recovered; and this is true, with the exception of a verbal report he gave of the D. family, but that was given after they were partially recovered, consequently giving me no chance to thoroughly prevent it from spreading. This diphtheria has been of rather mild form. There have not been but two deaths resulted from it in this vicinity, one in this town, one in the adjoining town, under the care of the same physician, and I think the spread of this disease is somewhat due to the doctor's disregard of orders concerning the infection, and wearing the same clothes to see these cases, and being around it, and over it, and then in town and around other children. He also says it is not infectious, and tells the people so, which makes it harder to restrain, and causes the people to be more dilatory in reporting. What are we to do when doctors and pretended sanitarians act in this way? It is hard to punish people who virtually are not to blame for not doing their duty. Give me your opinion on this matter. The probability of the case is that the disease will hang around until it will take on a malignant form, and then every one that gets it will die suddenly, without much warning, especially small children.

A different public sentiment with regard to contagiousness of diphtheria, and very satisfactory results of concerted action to restrict it are indicated in the following extract from a letter by Dr. Bion Whelan, health officer of Hillsdale, dated January 9, 1882, and transmitting his annual report for the year 1881.

During the past year we had a stringent ordinance passed for the prevention of contagious diseases, and although diphtheria has broken out twice, and scarlet fever three times, in different parts of the city, yet there has been no difficulty in maintaining strict quarantine, all the citizens co-operating with the health officer in his efforts to prevent its spread, and there has been a good demand for the publications of the State Board of Health.

SCARLET FEVER IN MICHIGAN—YEAR ENDING SEPTEMBER 30, 1883.

Reports are as yet not received of all cases of sickness from contagious diseases in Michigan. Yet in each year, recently, there has been an improvement both in the methods employed by the office of the State Board of Health for securing reports, and in the efforts by local health authorities to place the State Board of Health in possession of such information.

The greatest number of cases and deaths from scarlet fever reported in one locality in Michigan, for the year ending September 30, 1883, was in Detroit, being 871 cases and 123 deaths.

Two hundred and eighteen cases and twenty-two deaths from scarlet fever were reported at Grand Rapids during the year ending September 30, 1883.

One hundred cases and eleven deaths from scarlet fever were reported as having occurred at Traverse City, from November 13, 1882, to March 29, 1883.

The reports for the year ending September 30, 1883, show that in each of thirteen localities the outbreak was restricted to one case. Many outbreaks were limited to two or three cases. By means of special reports made at or about the time of their occurrence, one hundred and sixty-four outbreaks of scarlet fever in one hundred and fifty localities were reported in Michigan in

the year ending September 30, 1883; and in these outbreaks 1,802 cases and 248 deaths were reported from scarlet fever, the deaths being 14 per cent of the cases. This statement includes reports from Detroit for the full year. Excluding Detroit, the numbers are, 149 localities, 931 cases, 125 deaths. For the preceding year ending September 30, 1882, 82 localities reported 381 cases and 61 deaths from scarlet fever; and including Detroit, from which weekly reports were received for weeks ending January 28 to September 30, inclusive, 83 localities reported 849 cases and 138 deaths, the deaths being 16 per cent of cases.

It thus appears that the number of cases and of deaths for the year ending September 30, 1883, was greater than during the preceding year. Increased regard for public health interests and for the requirements of the law relative to reporting contagious diseases may, in part, account for the fact that more cases and deaths were reported in 1883. The use of the blank form (M) for weekly reports of contagious diseases, begun in May, 1883, doubtless secured more complete reports for the remaining months of that year, than had been received for the first months of that year, or for 1882. Making allowance for these considerations, however, it seems probable that there were more cases and more deaths from scarlet fever in Michigan during the year ending September 30, 1883, than in the preceding year. In the compilation on this subject for 1883, page 390 of the report for 1882, attention was called to the danger of an increase of scarlet fever in Michigan. But for the timely distribution of documents by the State Board and the prompt and vigorous action of many local boards, this increase might have been much greater than it seems to have been.

The statements in the preceding paragraph relate to years ending September 30. Referring to other near periods for which returns have been compiled, it is found that for the calendar year 1881 the number of deaths returned to the State department as having occurred in Michigan from scarlet fever, was 383; for 1882 it was 592. Scarlet fever was reported to this Board in the calendar year 1881 on 19 per cent of the weekly report cards received from health officers of cities and correspondents of the Board; in 1882 it was reported on 18 per cent. (The weekly reports for 1883 are not yet compiled.)

SOURCES OF CONTAGIUM.

Dr. A. B. Avery of Farmington, reported the appearance of scarlet fever in the family of an undertaker, and again in the family of a peddler. The sources of contagium in both instances seemed to be directly associated with the occupation of the heads of the households. Another observer stated that the family in which the first case occurred had scarlet fever a year previous. Cases were reported by others as having been communicated to persons occupying beds which had previously been occupied by persons having scarlet fever. Scarlet fever was also reported to have been communicated to persons in whom the evidence of the disease was so slight that it was not recognized until other, and serious, cases followed. One health officer reported an outbreak of scarlet fever where there were 100 cases and 11 deaths resulting from neglect of precautions because of a mistake in diagnosis, the first case that occurred having been called measles.

Dr. D. E. Robinson, health officer of Manistee, reported a case of scarlet fever in a child in a family of immigrants, it having been sick during the passage over, and dying soon after its arrival at Manistee. Dr. Robinson reported that other cases occurred among immigrants just arrived; he also reported a case intro-

TABLE.—*Stating names and localities of Health Officers and other officers who made special reports relative to scarlet fever, upon blank form "K" for final report of outbreak; also the number of cases and deaths from scarlet fever reported in this manner by them in their localities for the year ending September 30, 1883.**

NAMES OF HEALTH OFFICERS.	DIVISIONS AND LOCALITIES.	Cases of Scarlet fever.	Deaths from Scarlet fever.
	Total in 49 localities.....	*467	*64
	UPPER PENINSULAR DIVISION.....	44	7
W. A. Burnham.....	Rockland, Ontonagon County.....	18	1
Henry M. Haskill.....	Richmond, Marquette County.....	7	0
C. S. Lombard.....	Negaunee, Marquette County.....	19	6
	NORTHWESTERN DIVISION.....	164	22
F. E. Andrews.....	Bear Lake, Manistee County.....	2	0
E. B. Eaton.....	Filer, Manistee County.....	9	3
Peter E. Gustoff.....	Leelanaw, Leelanaw County.....	14	1
L. H. Hallock.....	Bingham, Leelanaw County.....	11	4
O. J. Kneeland.....	Traverse City, Grand Traverse Co.....	100	11
J. B. Martin.....	Cedar Creek and Manton, Wexf. Co.....	25	3
Assa W. Saddler.....	Greenwood, Wexford County.....	3	0
	NORTHERN DIVISION.....	107	10
German Button.....	Echo, Antrim County.....	15	1
John H. Hartwell.....	Helena, Antrim County.....	83	9
S. A. Johnson.....	Kalkaska, Kalkaska County.....	7	0
James J. McLaughlin.....	Elk Rapids, Antrim County.....	2	0
	NORTHEASTERN DIVISION.....	4	1
W. W. Wilson.....	Alpena, Alpena County.....	4	1
	WESTERN DIVISION.....	51	8
Wm. R. Dockry.....	Pentwater, Oceana County.....	15	1
Isaac M. Harrison.....	Sand Lake, Kent County.....	13	3
J. H. Johnson.....	Whitehall, Muskegon County.....	1	0
J. B. McNett.....	Grand Haven, Ottawa County.....	5	0
George Wright.....	Ensley, Newaygo County.....	8	0
J. S. Zukoskie.....	Ensley, Newaygo County.....	9	4
	BAY AND EASTERN DIVISION.....	8	3
N. D. Lee.....	Saginaw, Saginaw County.....	7	3
G. W. Stone.....	Metamora, Lapeer County.....	1	0
	CENTRAL DIVISION.....	16	1
A. H. Cameron.....	Windsor, Eaton County.....	4	0
J. B. F. Curtis.....	Hazelton, Shiawassee County.....	1	1
D. E. Fuller.....	Hastings, Barry County.....	2	0
D. Hollister.....	Ronald, Ionia County.....	0	0
H. R. Thoma.....	Burton, Genesee County.....	4	0
James Totten.....	Pierson, Montcalm County.....	5	0
	SOUTHWESTERN DIVISION.....	9	1
Amos J. Cook.....	Leighton, Allegan County.....	4	0
W. W. Mather.....	Saugatuck, Allegan County.....	1	0
J. S. Pardee.....	Weesaw, Berrien County.....	1	0
O. S. Robinson.....	Volinia, Cass County.....	2	0
J. F. Young.....	Douglas, Allegan County.....	1	1
	SOUTHERN CENTRAL DIVISION.....	42	6
G. F. Bennett.....	Amboy, Hillsdale County.....	3	0
E. H. Hurd.....	Union, Branch County.....	1	0
E. L. Kimball†.....	Jackson, Jackson County.....	5	0
J. M. Long.....	Coldwater, Branch County.....	3	0
C. H. McKain.....	Brady, Kalamazoo County.....	3	0
A. S. Martin.....	Texas, Kalamazoo County.....	2	0
Franklin Noyes.....	Adams, Hillsdale County.....	1	0
S. C. VanAntwerp.....	Vicksburg, Kalamazoo County.....	4	2
N. C. Woodcox.....	Bethel, Branch County.....	17	4
Henry S. Wyman.....	Morenci, Lenawee County.....	3	0
	SOUTHEASTERN DIVISION.....	22	5
A. B. Avery.....	Farmington, Oakland County.....	5	2
C. L. Chandler.....	Richmond, Macomb County.....	3	1
E. M. Otton.....	Highland, Oakland County.....	2	0
G. W. Richardson.....	Dundee, Monroe County.....	4	0
L. E. Wickins‡.....	Holly, Oakland County.....	8	2

*By means of these special reports, and others made at or about the time of their occurrence, 164 outbreaks of scarlet fever in 150 localities were reported in Michigan in the year ending Sept. 30, 1883; and in these outbreaks 1,802 cases and 248 deaths were reported.

†Member of local board of health.

‡President of local board of health.

duced into Manistee from Milwaukee. Dr. A. Kline Thiel of Marquette, reported three cases among immigrants from England, the cases having been contracted on the steamer. Dr. Schaberg, health officer of Kalamazoo township, also reported a case of scarlet fever in an immigrant family, the disease

having been, like others mentioned, contracted on the journey to this country. I. N. Moon, health officer of Zeeland township, wrote, December 6, 1882, that the origin of the outbreak of scarlet fever in that township could be traced to immigrants from Holland, who had the disease when they landed in New York City.

PERIOD OF INCUBATION.

There are many difficulties in determining the exact period of incubation of a contagious disease. In scarlet fever the "primary fever" may sometimes be so mild as to escape observation. Again, after the exposure, the specific poison of the disease may sometimes be carried about the person, as in the hair or clothing, for a considerable time before introduction into the system. In such cases the period of incubation would be made to appear longer than it really was. However, it is the period of time, after exposure, during which one may expect a child who has not had the disease, to be taken sick with scarlet fever, that is of most practical importance. The following observations bear upon this subject.

Dr. F. E. Andrews stated that in an outbreak of scarlet fever at Bear Lake, the first case came down 12 days after being in a house where the disease existed. Another case occurred in the same family 11 days after the first case made its appearance. Dr. John B. Hartwell, health officer of the township of Helena, reported 83 cases of scarlet fever, with an average period of incubation of three days. Dr. Haskell, health officer of Richmond township, wrote: "I have four cases in one family, all of whom came down with the disease inside of a week." Another stated that in an extensive outbreak the period of incubation varied from two days to three weeks.

OUTBREAKS OF SCARLET FEVER, AND ACTION BY BOARDS OF HEALTH IN RESTRICTING THEM.

Dr. E. F. Chase, health officer of the village of Dexter, reported November 9, 1882, as follows:

Since my last letter informing you of the presence of scarlet fever in our village, there have been four new cases in two separate families, the source of contagion probably being from those first reported.

The board of health has quarantined the houses, stopped all except the principal's room of schools, and exerted every effort to keep it from spreading, of which we are much afraid, as two cases came down in the primary room at school. In regard to those first reported (four), two died, and two are convalescent. We are now engaged in disinfecting and cleansing the house for this purpose I have had to remove the family, as house consists of one room.

In this I am sorry to say, I am fought by a few people and one leading physician, who says there is no use of removing or disinfecting, just allow them to clean up as best they can. But as one of the board of health for this village, I intend to use the means recommended by the State Board of Health, and such other as I think expedient, and thoroughly disinfect each house where scarlet fever has been, in my jurisdiction. Of the four new cases I would report all doing nicely, with good prospect of rapid convalescence.

No further reports of the prevalence of scarlet fever at Dexter were received.

Dr. C. S. Lombard, health officer of Negaunee, reported, January 5, 1883, an outbreak of scarlet fever in which 40 cases had occurred, but he could discover no source of contagion for the first case, unless from a neighboring city (Ishpeming), where the disease was prevailing lightly. He also wrote:

In about one third of all the cases, so far as I am able to learn, the patients were isolated from every one but nurses and medical attendants. Cloths, &c., containing discharges burned; visitors prohibited; skin of patients rubbed with an ointment of carbolated cosmoline. Disinfecting gargles used; patients isolated for fully one week after all symptoms of disease were manifest. The

remaining cases were handled in the same way as nearly as possible. The success attending the efforts at restriction was not well marked. Cases treated where quarters were close and many children in the same room with the sick, did as well as the others; no greater contagion followed. About one-half showed symptoms of the disease within five days of exposure, one fourth within three days. Remainder were variable, some going for a week, ten days, and in one instance fully two weeks, as far as I am able to ascertain. At the present time there are no cases in my jurisdiction.

April 30, 1883, Dr. Lombard wrote that from January 1, 1883, to April 30, there had been 19 cases, and that their efforts at restriction had not been very successful. Concerning the spreading of the disease, he wrote as follows: "The disease was carried by different members of families, and in some few cases was traced easily. Other cases very obscure, springing up in remote portions of the city. Disease traveled east, then west, then east, north-east, and southeast, with and (apparently) against the wind, most fatal when traveling in an easterly direction." Scarlet fever was reported at Negaunee the following month, and also September 15, 1883, near the close of the year.

Dr. A. S. Martin wrote concerning scarlet fever in Texas township and its source, as follows:

"On the 28th of March, 1883, Mr. and Mrs. A. of this township, accompanied by their four little children, paid a visit to friends living in the township of Oshtemo. There had been cases of scarlet fever at the house where they visited, but the house, it was thought, had been properly disinfected. Notwithstanding, Hattie, a little child of Mr. and Mrs. A., came down with the disease on the following morning. One after another of the children became infected, but they all made a good recovery, and the disease did not spread from them, owing, undoubtedly, to strictly enforced quarantine and thorough disinfection."

Dr. S. L. Jones, health officer of Summerfield, wrote April 19, 1883, concerning an eruptive disease at that place, and of which the diagnosis was not clear, as follows:

There is one subject on which I desire "more light." We have had among us for a year past an eruptive disease that I do not know where to place. In some respects it resembles measles; in some scarlet fever. The eruption somewhat resembles measles; the sore throat and sequelae resemble what we find during and after the primary attack of scarlet fever. I saw one fatal case of acute nephritis following a case of "tonsillitis with an eruption," as the attending physician termed it. A patient of mine had rheumatic symptoms following exposure to cold soon after recovering from the eruption. A patient I have now during primary attack shows a marked malarial condition.

We have all kinds of names for it from rotheln down to scarlet rash. As I find no trouble in meeting the indications, I would only ask, what is it? Is it contagious?

In a letter from this office in reply to the one from Dr. Jones, it was suggested that it would be safest for the public to regard the disease as communicable, and possibly scarlet fever.

Dr. D. E. Robinson, health officer of Manistee, May 10, 1883, wrote as follows:

Since my appointment as health officer four cases of scarlet fever have been reported, one case in an emigrant family, "Polish." It was sick before it left the boat on its way over from the old country. It arrived here in the desquamative stage. They remained here two or three days before calling a physician, so the case was not known as promptly as it should have been. The child died the day following its discovery. The house was placarded; no children allowed in, or parents whose children had not already had the fever. The house was thoroughly disinfected with burning sulphur; no public funeral allowed. The child died a week ago, and no cases have appeared from it yet, and we hope none will.

A second case occurred in a child just returned from a visit to Milwaukee. The child was isolated from other children of the family; is doing well, and we hope no more cases will come from that source.

There was one case in the city at the time of my appointment, for which no source could be detected. Another case came from this; a young girl who was not in the sick room but washed the dishes which had been used about the patient. She was in the house but one day when she felt poorly, returned home, and had an ordinary attack of croupous pneumonia, which terminated favorably on the ninth day by crisis. On the tenth day she became worse, had a chill, and the scarla-

tina made its appearance. If she would not communicate the disease previous to the tenth day I think we shall have no cases from this source.

Another case has appeared, reported Tuesday, the 8th, for which no source can be ascertained. We are trying by strict isolation to prevent any farther spread of the disease.

One case of diphtheria was reported this morning, the first in some time, of which the source of contagion is not known.

I find it very hard to get the physicians to inquire out the source of a contagious disease; and some object to another physician calling to make such investigation. Shall I call and inquire where the physician in attendance does not learn the source of contagion? I think that many more cases could be traced to their source if the physicians would make persistent efforts.

Dr. L. H. Hallock, president of the village of Bingham, wrote, Sept. 24, 1883, concerning scarlet fever among the Indians at Sutton's Bay, as follows:

The first case of scarlet fever occurred on September 14th; that is as near as I can learn, as the outbreak is among the Indians, and they are very reticent and indefinite in their reports. The cases were only discovered by accident and then close inquiry; and even now I doubt if the report is full and correct. I shall endeavor to find all the cases occurring, and report to you regularly. The pamphlet on scarlet fever has been thoroughly distributed throughout the township.

SMALL-POX IN MICHIGAN—YEAR ENDING SEPTEMBER 30, 1883.

During the year ending September 30, 1883, small-pox occurred in eight localities. Only twenty-nine cases and two deaths were reported. During the preceding year small-pox occurred in sixty-one localities; the number of cases reported being five hundred and eighty-nine, and the number of deaths one hundred and fifty-nine. The history of the various outbreaks occurring during the year ending September 30, 1882, is given on pages 390-433 of the Annual Report of this Board for that year.

The last case of small-pox since reported to this office occurred in June, 1883. Michigan has been free from small-pox since that time. That Michigan is thus free from this loathsome disease is almost entirely due to the efficient efforts to restrict its spread made by the local boards of health coöperating with the State Board, and to the National Board of Health, which for many months maintained a system of immigrant inspection, with vaccination of immigrants at ports of entry in this country.

In May, 1883, small-pox being known to be still present in other States in the Union, the following circular of warning was issued from the office of this State Board of Health by order of the Board:

A WARNING RELATIVE TO SMALL-POX.

[62.] OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH, }
LANSING, MICH., May, 1883.

At a recent meeting of the State Board of Health, the danger to the people in Michigan from the introduction of small-pox from cities and States in which small-pox is present was presented, and the issuing of a circular of warning was authorized.

This circular is issued, then, to notify officers and members of local boards of health of the reported existence of small-pox in New Orleans, Nashville, Chattanooga, West Virginia, and in Indiana,—places from which many visitors come to the various delightful places of summer resort in Michigan.

Another source of danger is the importation of small-pox by immigrants settling in all portions of the State, particularly in localities where lumbering is a prominent business. Immigrants may sail from European ports in which small-pox is present, or come in contact with the contagium of small-pox on board ship, and the period of incubation of small-pox and the rapidity of travel are such as to permit an immigrant exposed to the disease in some European port to show no sign of the disease until he is settled in his Michigan home. On this account it is desirable for health authorities to keep newly arrived immigrants under sanitary surveillance so far as is practicable.

Small-pox is a contagious disease which usually can be suppressed only by the prompt action of the health authorities, assisted by the coöperation of the people; and for the best success in its restriction it is important that prompt notice of the occurrence of a case of small-pox shall be

given, as the law requires, to the local board of health of the township, city, or village in which the case occurs. Prompt notice should also be sent to the office of the State Board of Health.

With this circular is sent one copy of a document issued by this Board, giving full directions for the prevention and restriction of small-pox. Copies of the document may be obtained by addressing this office.

With over one hundred outbreaks of small-pox during last year in Michigan, due to its introduction by immigration and other travel, the experience indicates that, as at present organized, the health authorities are able to deal with this disease with comparative success; but that in localities where the disease is not promptly recognized, or it is called "chicken-pox," a considerable number of cases and some deaths are liable to occur before the spread of the disease is stopped. Hence the importance of being watchful to detect the very first introduction of the disease, and prompt to act for its restriction as soon as detected.

Michigan is now free from small-pox. It is hoped that by active watchfulness and general coöperation the State may continue to be free from this disease.

By direction of the State Board of Health.

Very respectfully,

HENRY B. BAKER,
Secretary.

SOURCES OF CONTAGIUM OF SMALL-POX.

The source of contagium in most cases could easily be traced to some of the various outbreaks of the preceding year. In one instance it was supposed to have been brought from Chicago. In another the source of contagium was traced to infected clothing at Ionia. One reported that the first case in his locality was that of a man pursuing the occupation of scavenger. As a result of this outbreak, seven cases and one death were reported. An interesting account of the introduction of small-pox into the State by immigrants is given on page 43 of this Report.

OUTBREAKS OF SMALL-POX IN MICHIGAN DURING THE YEAR ENDING SEPTEMBER 30, 1883, AND EFFORTS OF BOARDS OF HEALTH TO RESTRICT THE DISEASE.

On October 3, 1882, Mr. George A. Love, clerk of the board of health in Grand Rapids, reported a case of small-pox. October 4, he wrote as follows:

As I reported to you yesterday, we found a case of small-pox in first stages; eruptions just beginning to show. After calling in the aid of police (for we could not do otherwise), we removed the family to hospital. Our judgment was that it was not safe to quarantine them at home. They were determined not to go, but are there now and doing well. From what I can learn there has been no exposure outside of the family. Will report promptly anything new.

Mr. Love wrote again on October 9, as follows:

A suspicious case was reported to me on the 7th. An investigation was not satisfactory. We called in four physicians and Health Officer Holden. One pronounced it no case of small-pox; the others were inclined to think it was, or would be, a mild varioloid. We gave the city the benefit of the doubt, and removed the person to hospital and fumigated the premises. To-day it is a well marked case of varioloid, but very mild. Our patient of October 3, is nearly well; will be discharged about the 14th.

October 30, Mr. Love wrote:

We are doing well with our small-pox patients. Discharged one cured on Saturday, 28th. Have now in hospital one family. The wife has had the disease in Holland. Husband and two children are now ill from it; two of them are convalescent, and the third one, two months old, doing well. As they were removed to hospital four weeks ago next Wednesday, and no new cases, we think we are done with it for this time.

And again on Nov. 1:

We have had from March 1st, to October 1st, seventy-eight cases of small-pox and varioloid, with twenty-three deaths. Since October 1st four cases, one discharged cured, and three convalescents remaining in hospital at this date.

Another case was reported by Mr. Love on November 14. On November 17, 1882, he again wrote:

We have one case yet in hospital, the only one in the city. It has been a very severe case, but

now seems to be safe for recovery. Our late cases were handled so promptly and sent to hospital so quick, there has been no other cases from any of them.

Mr. Love wrote December 15, 1882, that the last case had been discharged. No other case has since been reported in Grand Rapids.

Dr. Irwin Simpson, health officer of Niles, reported October 21, 1882, one case of varioloid. No other case from this outbreak was reported to this office.

Dr. D. Kelley, health officer of Lyons township, reported a case of small-pox in Lyons township, on December 2, 1882. On June 7, 1883, Dr. Kelley reported that from April 23 to May 21, three more cases occurred in his jurisdiction. Since that time no case has been reported in Lyons.

Dr. A. G. Cowles of Durand, wrote January 8, 1883, as follows:

There is a boy whose home is here, who has been in Tennessee and lately came home, being driven out of Chattanooga by small-pox. Should he be allowed to attend school? The district all object to his going, but say if he can get a certificate from the board of health he can come. I refused to sign it. It has been eleven days since he left there. What should be done?

The following reply was sent from this office: "In reply to your card I would say, the boy should be required to wait three weeks from date of last exposure, before being allowed to mingle with other persons, the health officer keeping a close surveillance over him."

Four cases and one death, from small-pox, were reported in Royalton, Berrien county, in January, 1883.

Dr. E. S. Richardson, health officer of Richmond township, Osceola county, reported January 2, 1883, five cases of small-pox in that township. No further cases were reported.

Dr. H. H. Schaberg, health officer of the township of Kalamazoo, wrote June 10, 1883, as follows: "Would report five cases of small-pox in Kalamazoo township. Will write full particulars as soon as I can. Proper precautions have been taken."

June 12, he again wrote as follows:

Three weeks ago to-morrow Mr. John Z— came to the office of one of our physicians with a rash on his face and body looking, as I understand, like urticaria. The physician did not attach much importance to it, and sent him away. Some four or five days afterward the man sent for the doctor, feeling quite ill and having an eruption on his face and body. The physician examined him and pronounced it to be a case of chicken-pox. The man was satisfied, and as soon as he felt able resumed his occupation, which is that of scavenger and manufacturer of glue. Meanwhile, on Monday, the 4th day of June, his daughter, aged 15, was taken with an eruptive disease, which was also supposed to be chicken-pox. On the 5th his wife, aged 35, showed the eruption. She had been quite sick for a few days but soon got up and around, supposed she had the same disease. Thursday, the 7th, two more children, females, aged 11 and 5 respectively, came down; on the 9th, Saturday, the baby, aged 4 months.

Sunday morning, at 5 A. M., the doctor was again sent for, and discovered that it was something worse than chicken-pox. He called on one of our doctors, who agreed with him as to the nature of the disease, and notified me. I went and found one case varioloid, convalescing, viz.: the father; and the others named, in the various stages of the eruption; the baby's eruption being confluent. I notified the authorities and took such steps as I deemed necessary to enforce a strict quarantine. This morning another male child, aged about 3 years, showed symptoms of the disease. The children, at least two of them, had attended school while the father was sick; and the neighbors believing that the disease was chicken-pox had free intercourse with the family, assisting them in kindly offices, while the father was every day around engaged in his business.

All the scholars and teachers not already thoroughly protected in the school were vaccinated or sent home. Four women who had been in the house were quarantined, and their families placed under surveillance.

Of course there is no telling what may be the result, as so many were exposed, but I sincerely hope that the disease may be confined to the one family. The baby died this morning, and will be privately interred this night. The remaining child in the family, a boy about 13, has been vaccinated, but it may be too late. The cause of the disease I have been unable to discover, and unless he contracted it while making a trip to Schoolcraft he must have contracted the disease while pursuing his business as scavenger.

On June 16 Dr. Schaberg reported that seven cases, all in one family, had occurred, and one death. At this date he also wrote: "In this family there is one boy, aged 13, whom I vaccinated June 12, 1883, and who has not shown any indications of coming down with the disease, and from the appearance of the arm I am inclined to think the vaccine will take."

On July 3 he wrote as follows:

The small-pox is virtually over. I am at present disinfecting the house and contents.

Again, on July 7, Dr. Schaberg wrote:

The cases here have resulted very favorably, the one which died being an infant of only 4 months which had been sick with confluent small-pox for some days before it was seen by a physician.

MEASLES IN MICHIGAN IN THE YEAR ENDING SEPTEMBER 30, 1883.

Dr. A. S. Martin, health officer of Texas township, Kalamazoo county, wrote January 16, 1884, as follows:

"The first case of measles (in 1883) manifested itself in the person of T. W. He had been stopping in the township of Antwerp, Van Buren county, where he became infected. He came home to stay during the period of incubation. On the morning of the day of eruption he started (impelled, undoubtedly by a feeling of unexplained restlessness), made a number of calls at neighboring houses, passed through the township of Prairie Ronde, making several calls, and ended up by appearing on the streets of Schoolcraft in a fine and well-developed state of eruption. It is needless to say that he infected every one with whom he came in contact who were susceptible to infection. One death can be traced to his act of recklessness."

Dr. H. C. Maynard, health officer of Hartford, Van Buren county, wrote, April 13, 1883, as follows:

We are having a severe epidemic of measles. Over one hundred cases so far, but none fatal as yet. The disease was imported from Decatur.

Dr. D. E. Robinson, health officer of Manistee, reported in May, 1883, three cases of measles, all in an immigrant family just arrived.

Dr. S. C. Ayers, health officer of Fairfield, Lenawee county, wrote to this office, May 30, 1883, relative to measles in that township, as follows:

We have three villages in this township (Fairfield, Weston, Jasper and Fairfield. Joseph Grandy brought the measles into Fairfield. No one reported his case. The doctor did not report to me or to the township clerk. About the 10th of April I learned that the measles was in the village of Fairfield. I immediately visited the village and found about twenty persons down with the measles. I put up notices at each place. I not being notified in season, a great many had been exposed and measles have been on the "rampage" ever since. I have tried to have heads of families report to me as soon as any of their children were taken. I have received about five such notices. I rode four days looking up cases and to get statistics. I found two infants had died of measles. I shut the disease down in Weston; only one family had them.

Dr. Ayers in another report, stated that 82 cases of measles occurred in Fairfield township, from the last of March, 1883, to May 30, 1883. He attributed the continuance of the outbreak to the general disregard, by the people, of what the law says in regard to reporting the presence of the contagious disease to the health officer, and of its contagiousness.

Dr. J. Camp, of Bangor, in regard to repeated attacks of measles in the same person, wrote, May 27, 1883, as follows:

Our weekly record of diseases for May—and June will probably be the same—amounts to but little but measles. There is, however, just enough about it to excite the curiosity of some, especially the mothers of the present generation. About one-third of the adults that have it now have had it before. Many of them I saw when having it the first time, having lived in this vicinity for the last thirty-eight years. H. C., of Breedsville, this county, now deceased, had it *three* times. I saw him each time. Ten years ago a man west of Bangor, in Bangor township, 23 years old then, had it twice—hard—the same season. I saw him each time. He reports to me that he is now just recovering from a hard attack of measles, which has left a bad cough; wants to know what to do for it, as I helped his cough after his two other attacks.

RÖTHELN—GERMAN MEASLES.

Dr. S. J. Hutchinson, of Northport, Leelanaw county, wrote, December 22, 1882, concerning several cases of sickness in the townships of Leelanaw and Garfield that appeared to be cases of rōtheln, as follows:

Your letter dated December 15 came to hand the 19th inst. You address me about a disease stated in the papers to be prevailing in this vicinity resembling and having been thought to be pink eye, contracted from the horse suffering with that disease.

After taking as short a time as possible to investigate the matter as best I could (not being health officer this year) I hasten to reply and make a statement of what I know and can find out about the matter, briefly.

There has been a disease prevailing hereabout among children of a few families, and *seemingly* infectious, but of obscure nature and origin. As nearly as I can learn, it has been confined to three or four Canadian French families and one neighboring Norwegian. I have been called to treat in but three of the families, and those cases of relapse. Two of these families were Canadian French, and one, Norwegian. But in the latter family the only one I was called upon to visit was a little girl who had been debilitated from several previous attacks of profuse bleedings of the nose, to which she is subject. Her symptoms were quite different from those reported of the other children of this family who had at the time of my visit (November 29) quite recovered from slight ailment with which (the parents said) they had been affected. This patient made a recovery as rapidly as could be expected.

The first I learned anything at all about this disease was November 9, when I was called upon to visit a three-year-old boy of one of the above mentioned Canadian-French families—a case of relapse from an acute attack of a disease which I learned began October 18. The mother of the child then told me that the first symptoms resembled *measles* in the eruption and in the catarrh, accompanied with redness of eyelids. But this child, with the other children had previously had the measles. She stated that she thought it could be traced to a sick brother of her own who had been handling a horse affected with the pink eye. This statement of hers is what gave rise to the report which you have seen in the papers. The other children of the family, she said, had been sick with the same disease. This child's leading symptoms, at the time of my visit, were general oedema, rapid respiration, slight redness of the throat, with nausea and vomiting. I saw the child but this once. I learned that it died the second night following. The brother, above mentioned, living at Garfield (from here distant about five miles), called on me, November 16, to treat a three-year-old daughter suffering a relapse from exposure to cold, following convalescence in the same disease, first contracted October 18. This date, he tells me, was just two days subsequent to his own attack of disease mentioned by his sister, as above stated. He says, however, that the pink eye of the affected horse, with which he had to do, was *subsequent* to his own sickness. This child immediately recovered under treatment.

A few days after my visit to Garfield, I was called upon to send medicine for the *second* of these two children (two years old), suffering in a similar way to the first, and whose first attack also occurred several days later than its. Immediate recovery followed in this case. My treatment of the above mentioned two cases (also of the Norwegian child) was to restore promptly all secretions, together with free use of antiseptic drinks.

The above are all the cases of this disease that have come under my observation. However, I understand that another Canadian-French family at Garfield, also related, lost all three of their children. I am told by neighbors that in all these three there were serious throat complications. Thus it will be seen that my observation of the disease has been limited, as I have not seen any case in its first stages. Those families affected have not deemed it necessary to send for a physician unless a relapse occurred. Also, not being health officer this year, and not having been called upon by the health board to attend to the matter, I have therefore not had opportunity for sufficiently investigating the disease. Each case visited I have reported personally to the health officer (who is not a physician) on the same day after seeing the patient, and have advised him to prohibit the children of these families from attending school, or other communication, until the persons, clothes, and furniture had been disinfected by proper solutions. All this I have also directed those parents to do by whom I have been called upon. I know of no cases of the disease now existing.

As to symptoms, both primary and secondary, there seems to have not been uniformity. In some there have been no eruption, no throat affection, no vomiting, no lung trouble. In others reported there have been all of these, also oedema of face and body, glandular swellings. So far as I have learned about it, the disease seems to me most to resemble German measles (Rubeola rōtheln).

TYPHOID FEVER IN MICHIGAN IN THE YEAR ENDING
SEPTEMBER 30, 1883.

From the month of May, 1883, at which time local health officers were supplied with blanks for weekly reports to this office of the progress of an outbreak of any disease dangerous to the public health, to September 30, 1883, there were reported to this office, from ten localities in Michigan, 30 cases with 13 deaths from typhoid fever. Special letters were not generally written asking for final reports of outbreaks of typhoid fever. The circular on "Work of Health Officers," printed on pages 67-78 of this volume, sets forth the duty of health officers to make such reports.

Dr. Alex. Shaw, health officer of Shiawassee township, wrote, Nov. 14, 1882, as follows:

I have a case of typhoid fever under my care in the village of Bancroft, township of Shiawassee. This is the fifteenth day of the fever. There is no other case that I know of in the township, and has not been for some months. The only places where the young man has been away from home are Flint and Fentonville, where he attended fairs about three weeks before the fever came on him. I understand there are no cases at Flint; as to Fentonville I do not know. Thus far I am unable to trace the disease to its source of infection.

To prevent its spread I have ordered the stools to be disinfected and buried, and enjoined cleanliness of the patient. I have not quarantined the house as I think it is not necessary in this disease, but I will do so if you require it.

Dr. Shaw wrote again, January 2, 1883, as follows:

I have to report the occurrence of two more cases of typhoid fever in the village of Bancroft, township of Shiawassee. They are in the same family as the case reported in November. One case fever began December 22, 1882; the other, fever began December 25, 1882.

This makes three cases in the present outbreak. No deaths so far; the first case having recovered, the second and third being still in progress. The source of the contagium in the first instance I have not been able to ascertain, and to prevent others taking it cleanliness was strictly ordered.

Dr. D. W. Flora, health officer of Newaygo, wrote, December 15, 1882, as follows:

I have three interesting cases of typhoid poisoning to report, and one of scarlatina. The typhoid cases are all in one house and one family, viz.: The father and two sons; father, aged 45; sons, 15 and 6. Pneumonia was present in all of them when first seen, and all the typhoid or blood-poisoning symptoms were developed fully within 48 hours of the attack. These were a brown, dry, cracked tongue, *subcaltus tendinum*, and active delirium. Delirium in the father was preceded by the most profound stupor of four days' duration. The conditions under which this most virulent attack was engendered were gross and palpable; an old cellar under the house partly filled with water and decaying wood, rubbish, and rotten vegetables; the sills and floors one foot below the surface of the ground; the kitchen and outhouse were filled with old clothes and rags slowly festering and covered with fungus; a cow-stable adjoining the kitchen, with a door open for communication; in fact the excrements were lying all around the dwelling. But, strange to say, this poison did not fully develop until the extreme cold weather, which compelled them to shut up the house closely and crowd into a single room a family of 8 persons. But the best news is that they are in a fair way to recover.

Poor diet, hard, mean, dirty bedding, and entire neglect of personal cleanliness were some of the preceding conditions of this family. I tell the people there is no *contagion* in the house, but if any one should become an inmate, breathing the same air, eating the same food, say as a nurse, he might easily become *infected*.

H. N. Cargill, clerk of the board of health of Grand Rapids, wrote, September 18, 1883, as follows:

Herewith we send weekly report showing an unusual increase in typhoid fever, which, if it should continue, certainly would be cause for great concern upon the part of this board. Four of these cases were cases that should have been reported to us in the latter part of August, but we now report them as we received them. The long dry weather reducing the water in wells and excessive heat, the last week in particular, will account for it mostly, no doubt, together with unsanitary conditions of premises. We have not as yet made a thorough examination of surround-

ings, but shall, and of the water in particular, as far as we have the ability. If we discover anything that we might consider of interest or benefit, of course will communicate with you.

RELATIVE TO REMOVAL OF BODIES DEAD FROM CONTAGIOUS DISEASES.

Two children died at Newaygo, from Diphtheria, in April, 1881, and were buried in the Newaygo cemetery. The year previous a child had died from measles, and was also buried there. A young man who died from malignant scarlatina, within 48 hours after being taken sick, was also buried there. These four bodies it was attempted to have removed from Newaygo to Grand Rapids, without the consent of the health authorities. The bodies were exhumed and taken to the undertaker's, where they were found by the health officer who promptly ordered their reburial. Soon after, a letter was received at this office asking if the bodies could be removed under the laws of this State.

To this it was replied that as far as removing the bodies dead from diphtheria was concerned there would be great risk. If it was to be done a permit would be required from the board of health in Newaygo, where they were buried, and from the board of health of Grand Rapids, to which place they were to be removed, and, that if permits were obtained, the removal should be accomplished under the direction of some person skilled in disinfection.

According to a letter from the health officer of Newaygo, dated April 16, 1883, the bodies were not allowed to be removed.

November 18, 1882, Dr. Batwell, health officer of Ypsilanti, reported the introduction of two cases of diphtheria into that place from Detroit. They were associated with the removal of the body of a child from Detroit to Ypsilanti, who had recently died of diphtheria. He wrote as follows:

Two sad cases of diphtheria brought from Detroit. One, the mother of a child who just died of it; the other, her sister, who went to the funeral and came out with the body for burial here and slept in the house in Detroit for two nights. Have hopes of saving both, though very sick. I thought they did not allow dead bodies of infectious diseases to be removed from the city, else I would have had a very slim attendance *here*.

In answer to a letter of inquiry from this office to health officer O. W. Wight, M. D., of Detroit, the following reply, relating to the statements in the foregoing communication from Ypsilanti, was received on November 22, 1882:

Yours of yesterday received enclosing copy of letter from the health officer of Ypsilanti. Said health officer gives no names, dates, or other clues. The only thing shown by the records of my office is the following:

Archie S—, aged six years, died of diphtheria, October 16, 1882, and the same day special permit was issued by me to remove his body to Ypsilanti for burial, under the conditions (1) that the body be wrapped in sheet saturated with strong solution of chloride of zinc (50 per cent solution was used by undertaker Hamilton as he said) when placed in tight coffin, (2) coffin to be packed in saw-dust saturated with chloride of zinc solution, (3) neither coffin nor box containing it to be opened after leaving Detroit, (4) remains to be buried without funeral, immediately after reaching place of destination. The father of the boy promised solemnly to fulfill all the conditions. Hamilton, the undertaker, is a capable, conscientious man. My directions to S— were clearly written out in full.

Further than this I know nothing. If citizen S—, of Ypsilanti, did not follow directions, he is a subject of discipline by the local health officer.

DISTRIBUTION OF THE DEATHS REPORTED FROM DIPHTHERIA, BY COUNTIES, IN MICHIGAN, IN EACH OF THE SEVEN YEARS 1876-82.

BY REV. L. DELAMARTER, WITH ADDITIONS BY HENRY B. BAKER, M. D.

In 1882 there was received from Rev. Louis DeLamarter, then of Leslie, who for several years had been the clerk in charge of the compilation of vital statistics in the office of the Secretary of State, a map of Michigan giving by counties the number of deaths returned as having occurred* from diphtheria in Michigan, in each of the five years 1876-80, a table of deaths from this disease by sanitary divisions of the State, and a letter of comments thereon. The map is printed on page 113, the table as Exhibit 9, on page 112, additions having been made to both for the years 1881 and 1882. The letter is as follows:

LESLIE, MICH., *August 21, 1882.*

Dr. H. B. Baker :

DEAR SIR : I enclose a diphtheria map of Michigan (page 113) which I had made for the study of that disease by sanitary divisions, or rather according to local distribution. Of course, meteorological data are essential to the best study of the subject, but I have noticed in a brief examination of the map that:

1. There has been an increase in the number of deaths from diphtheria in this State from 1876 to 1880, the total increase during the period of five years being 1,231.

2. Drawing a line through the State, east and west, along the north boundary of Allegan county, it is noticeable that in each county south of that line (excepting Barry, Lenawee, Monroe, and Wayne), the year 1880 does not show so many deaths from this disease as does the year 1879. North of this line, of the remaining 39 counties in which there was an excess one way or the other in these two years, 23 counties show an excess in 1880, and 16 an excess in 1879. The largest proportional increase for the year 1880 is shown for the counties of Montcalm, Newaygo, Mecosta, Isabella, Midland, Osceola, Clare, and Wexford. So far as mere locality throws any light upon this subject, the most densely populated portion of the State has not suffered a great increase in deaths from this disease during the year in which the largest number occurred in the State. This might be expected to be the case with contagious diseases. Can it be that the newer counties paid less attention to restriction and prevention, thereby allowing the disease to continue

* A comparison of deaths returned in 1870 with those reported in the U. S. census for that year, showed that only about one-half the deaths which occur from all diseases are returned. The proportion returned for diphtheria may be greater or less than for all diseases, or it may be about the same.

to spread among the children? I think it is a fact that the sparsely-settled portions of a country are slower to follow an advance in anything, sanitation not excepted. Very Respectfully,

L. DELAMARTER.

By reference to the map (page 113) it may be seen that the counties in which there was a considerable increase in the number of deaths from diphtheria in 1881 or 1882 as compared with the previous year in which there were most deaths in the given county, lie both sides of the line joining the north lines of Allegan and Macomb counties. The greatest increase seems to have been north of that line.

EXHIBIT 9.—DEATHS Returned as Having Occurred from Diphtheria in Michigan and in Each of 11 Divisions of the State in the 7 Years and in Each of the 7 Years 1876-82; also Totals for the 5 Years 1878-82, and for the Same 5-Year Period (1878-82) the Rate per 1,000 Inhabitants at the Middle of the Period, June 1, 1880.

STATE AND DIVISIONS.*	Population, 1880.	Total Deaths in 7 Years, 1876-82.	FIVE YEARS 1878-82.		NUMBER OF DEATHS IN EACH YEAR.						
			Total Number Deaths.	Deaths to 1,000 Inhabitants.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
State.....	1,636,937	8,283	7,379	4.5	311	593	887	1,473	1,542	2,063	1,414
Upper-Peninsular.....	85,085	143	139	1.6	3	1	12	5	16	38	68
Northwestern.....	40,342	204	178	4.4	1	25	28	16	47	43	44
Northern.....	29,585	176	157	5.3	-----	19	32	20	9	44	52
Northeastern.....	24,263	117	108	4.5	8	1	5	7	4	68	24
Western.....	183,427	1,537	1,429	7.8	22	86	73	312	419	434	191
Northern-Central.....	39,798	578	575	14.5	-----	3	11	57	188	198	131
Bay-and-Eastern.....	245,679	1,466	1,334	5.4	51	81	124	311	288	396	215
Central.....	295,804	1,447	1,289	4.4	53	105	196	214	255	395	229
Southwestern.....	127,416	465	433	3.4	17	15	110	148	55	72	48
Southern-Central.....	292,306	1,012	750	2.6	86	176	175	201	89	189	96
Southeastern.....	273,232	1,138	987	3.6	70	81	121	182	172	186	326

* The counties in each division are stated in a map on page 113; also in Exhibit 1, page 5.

EXHIBIT 10.—SICKNESS FROM DIPHTHERIA—Stating, for the State and for Each of 11 Divisions of the State, on What Per Cent of the Weekly Reports received Diphtheria was Reported Present in Each of the 6 Years 1877-82.

STATE AND DIVISIONS.*	PER CENT OF PREVALENCE OF DIPHTHERIA.—SICKNESS REPORTS.							
	Average 6 Years, 1877-82.	Average 5 Years, 1878-82.	1877.	1878.	1879.	1880.	1881.	1882.
State.....	26	28	19	23	29	27	34	25
Upper Peninsular.....	4	4	2	2	4	2	2	9
Northwestern.....	-----	a	-----	-----	15	13	19	36
Northern.....	-----	-----	8	5	-----	-----	-----	11
Northeastern.....	-----	-----	-----	-----	-----	-----	-----	-----
Western.....	38	41	24	24	43	49	62	27
Northern-Central.....	-----	b	-----	-----	-----	63	64	33
Bay-and-Eastern.....	35	36	28	31	39	35	48	29
Central.....	29	32	17	29	31	28	38	32
Southwestern.....	17	18	12	17	31	21	14	8
Southern-Central.....	17	18	12	17	18	14	22	18
Southeastern.....	33	33	32	27	33	34	32	37

* The counties in each division are stated in a map on page 113; also in Exhibit 1, page 5.

a. For Northwestern Division, the average for 4 years 1878-82 is 31.

b. For North-Central Division, the average for 3 years 1880-2 is 53.

DEATHS FROM DIPHTHERIA IN MICH. IN EACH OF THE YEARS 1876-82, BY COUNTIES AND BY SANITARY DIVISIONS.

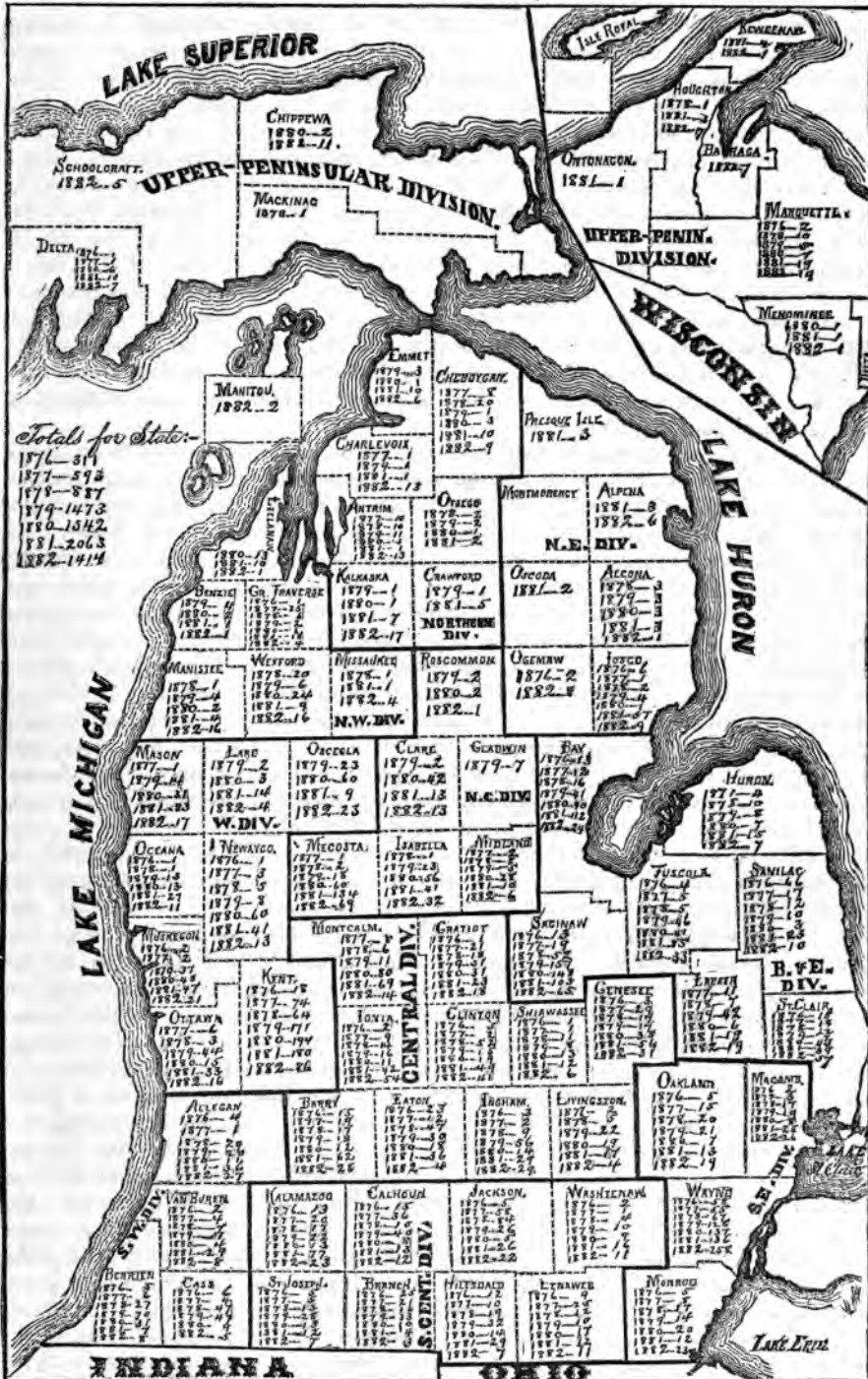


Exhibit 9, page 112, states the number of deaths returned as having occurred in each of eleven divisions of the State in each of the seven years 1876–82, and for the five years 1878–82 the total number of deaths from diphtheria, and the number to 1,000 inhabitants at the middle of the period, June 1, 1880. Exhibit 10, page 112, states on what per cent of the weekly reports, received at the office of the State Board of Health, diphtheria was reported present in each of eleven divisions, and in the State, in each of the six years 1877–82, also the average for the five years 1878–82. As to the distribution of diphtheria in Michigan, the evidence of Exhibit 10 relative to *sickness* from diphtheria, harmonizes well with that of Exhibit 9 relative to *deaths* from diphtheria. The number of deaths and the per cent of sickness from diphtheria were both greatest in the same year, 1881, and least in the same year, 1877. The greatest death-rate and the greatest sickness-rate occurred in the same division of the State, the northern-central; also the second greatest of both, in the western division; the least of both, in the upper-peninsular division.

There was great increase of deaths returned as having occurred from diphtheria in 1881 or in 1882, as compared with the preceding five years, both in certain counties having a large city population, as Wayne and Bay, and in counties in which the population is chiefly rural, as Mecosta and Iosco. In many counties, however, there was a marked decrease in both these years, especially in 1882. The general distribution of the disease, and its ups and downs in different counties, seem to be what might be expected in case of a contagious disease not altogether suppressed in any county, not everywhere treated as a dangerous, contagious disease, and met by intelligent and persistent efforts for its restriction. There are no known conditions of soil, climate, or filth by which its distribution over the State may be explained. That its distribution depends on travel and other means of communication between localities, and on the greater or less intelligent care to prevent communication of the disease, or to restrict it where it first appears, seems altogether probable. In cities, where there is greater communication between people, it is in some respects more difficult to restrict the spread of diphtheria. On the other hand, in thinly-settled country districts, especially where the contagious nature of the disease is not well understood, it is often difficult to secure proper care of persons sick with diphtheria and avoid direct or indirect exposure of persons susceptible to the disease. The general understanding and adoption by the people of measures recommended in the State Board of Health document on the prevention and restriction of diphtheria, will, it is believed, greatly lessen the prevalence of the disease in the State. The marked decrease in the number of deaths in 1882, as compared with 1881, considered in connection with the general distribution of these documents in the last four months of 1881, and since, is indicative of good done and to be done by these documents, and by the more general adoption of such measures as those documents recommend. This study of the distribution of the deaths as returned, seems to show that the maximum number of deaths from diphtheria was, as a general rule, reached soonest in the southern tier of counties, which are the counties most uniformly thickly-settled, and in which railroad and other facilities for the inter-communication of the people are most available. In some other counties where these conditions are similarly available, such as Calhoun, Ingham, and Saginaw counties, the maximum number of deaths returned from diphtheria was for the year 1879. In Jackson county it was markedly in 1878. It should, however, be noted that in the two counties in which are situated

the two largest cities in the State, the high mortality reached in 1879, and which seems to have been really greater than in the other counties, did not then decline, but continued to increase—in Kent county reaching its maximum in 1880, but holding up to nearly the same in 1881, while in Wayne county the highest point for these years was not reached till 1882, the disease seeming to have gained a permanent home and opportunity for destroying the children as fast as they come to the most susceptible age.

In a city once infected with the small-pox, or any such contagious disease, the methods by which the disease may be disseminated are so numerous, and the difficulties in tracing the spread are so very great, that no ordinary health service is adequate for the complete stamping out of the disease. This is particularly true respecting a disease like diphtheria in which there is no such preventive as there is for small-pox, in the vaccination of all not otherwise protected. It is especially true of diphtheria, which disease (unlike measles or whooping-cough) seems to be readily spread by articles which have been in rooms occupied by one having the disease, so that contact with a person sick with diphtheria is not the only way, and, perhaps, not the most usual way, in which this dangerous disease is contracted.

There is probably even another reason why diphtheria is such an exceedingly difficult disease for control by the health authorities. This may be appreciated by considering the fact, now coming to be understood, that it is frequently impossible to tell whether a sore-throat *in an adult person* is or is not diphtheria. About eighty-five out of a hundred deaths from diphtheria are of children under ten years of age. When diphtheria occurs in a family the adult members frequently have a sore-throat, sometimes not noticed unless the attending physician calls attention to it by his inquiries. If such sore-throats are carefully watched, a patch of diphtheritic membrane may sometimes be found on one of the tonsils; but the vital statistics show that very few adults die of the disease; and yet the reports of outbreaks of this disease which during the past few years have been received by the State Board of Health from local health officers and other physicians, in different parts of this State, leave little room to doubt that fatal diphtheria is not very infrequently contracted by children who come in contact with persons having such sore throats.

From whatever stand-point we study diphtheria, the conclusion is inevitable that the most complete isolation practicable of every case, and the destruction or most thorough disinfection of everything which has been exposed to infection from that disease, is of the highest importance, in order to restrict its spread.

In view of the fact that the urinary and other discharges from persons sick with diphtheria probably contain the specific cause of the disease, it is especially important to disinfect all discharges from persons sick with or convalescent from diphtheria.

The documents gratuitously distributed by the Michigan State Board of Health give the necessary instruction for procedure for the restriction and prevention of diphtheria under all ordinary circumstances connected with this disease.

HENRY B. BAKER,

Committee on the Death-rate as Influenced by Age, Climate, and Social Condition.

PUBLIC HEALTH LEGISLATION IN MICHIGAN, IN 1883.

REFERENCES BY THE SECRETARY OF THE STATE BOARD OF HEALTH.

The following laws relating to public health were passed during the session of 1883, and took effect September 7, 1883. All or nearly all of them are included in a pamphlet compilation of the public health laws of the State, printed as a supplement to this Report.

1.—Act No. 11. Amending laws relative to notices of diseases dangerous to the public health, and adding a new section thereto.

2.—No. 18. Adding a new section to Act 56 of 1881, imposing a penalty for removing from their proper place, except in case of accident, the tools required to be kept in passenger, baggage, mail, or express cars.

3.—No. 81. Amending section 28 of Act 175 of 1881, and authorizing the commissioner of railroads to prescribe the use of the interlocking switch and signal system.

4.—No. 107. Amending section 10 of Act 81, 1873.

5.—No. 131. Amending Act 167 of 1877, relative to height of bridges over railroad tracks.

6.—No. 137. Specifying certain duties of health officers, and providing compensation therefor.

7.—Act No. 138. To prevent the sale and use of toy pistols.

8.—No. 140. To regulate the practice of dentistry in the State of Michigan.

9.—No. 167. To promote the public health, requiring a registration of physicians.

10.—No. 170. To provide for the construction of fire-escapes from hotels, boarding and lodging houses, also to afford the necessary escape from fire in business places, and in buildings for public and private assemblages.

11.—No. 174. Amending section 14 of Art. IV of Act 198 of 1873, so as to permit trains on intersecting roads using an interlocking switch and signal system approved by the commissioner of railroads, to pass a junction without stopping; also adding a new section (22) requiring railroad companies to so adjust, fill, or block frogs, switches, and guard-rails as to prevent the feet of employees or other persons from being caught therein.

EXAMINATIONS OF PUBLIC BUILDINGS—YEAR ENDING SEPTEMBER 30, 1883.

REPORT BY THE SECRETARY OF THE STATE BOARD OF HEALTH.

Section 7 of Act 206 of 1881 requires boards of State charitable, penal, or reformatory institutions before adopting plans of buildings for school purposes, living-rooms, work-rooms, or sleeping-rooms for inmates, or for any system of sewerage, ventilation, or heating, authorized by the Legislature to be constructed, to submit such plans to the State Board of Corrections and Charities, and to the State Board of Health for examination and opinion thereon. On pages 339-343 of the Report of this Board for 1882 is a copy of the law and a report of examinations of plans for workshops at the State House of Correction, at Ionia, for improvements at the School for the Blind, at Lansing, and for new buildings at the Reform School at Lansing.

October 10, 1882, Hon. E. C. Watkins, warden of the State House of Correction, at Ionia, being present at a meeting of this Board, requested that a committee of the Board visit Ionia to examine plans for proposed additional buildings at the House of Correction, which it was designed to ask for at the next session of the Legislature. Drs. Avery, Hazlewood, and Baker were appointed a committee for this purpose, and Oct. 11 notice of their appointment was sent to Mr. Watkins with a request that he give notice when the plans would be ready for examination. The plans have not been presented.

July 10, 1883, at its regular quarterly meeting, the State Board of Health considered plans for the following State buildings: Two new wings for the School for the Blind, at Lansing; a hospital for the Michigan Asylum for the Insane, at Kalamazoo; a cottage hospital for the State Public School, at Coldwater; and a main building for the Industrial School, at Adrian. These plans, in some cases incomplete, had previously been examined by committees of the Board, as follows: For the Industrial School, by Drs. Hazlewood and Avery; for the School for the Blind and for the hospital at the State Public School, by Drs. Avery and Baker; and for the hospital at Kalamazoo, by Dr. Avery,—of which examinations reports were submitted at this (July 10) meeting of the Board. In some cases the plans as presented July 10 had been modified in accordance with suggestions made by the committees. The judgment of the Board with regard to the plans was as follows, and was thus communicated to representatives of the several institutions.

ADDITIONS TO THE SCHOOL FOR THE BLIND, AT LANSING.

The architect was present and explained the plans in detail, not all being yet represented on paper. The following propositions were made by him with reference to the building, and the action of the Board with regard to each is thereafter stated.

Drainage.—The underdrainage to be effected by a large central drain running through underneath the central corridors of the buildings, under the four-inch concrete floor of the sub-basement, into which smaller laterals shall be carried, leading under the foundations, through (under) smaller rooms. The laterals to be about eight feet apart, from center to center. The main drain to the building to communicate with one which leads to an outlet in an open field and in the open air. Approved by the State Board of Health.

Sewerage.—Each soil-pipe to have a fresh-air inlet opening at its foot, and to be continued full size through the roof to the outer air. All traps to be ventilated from their crowns to the outer air. Approved by the Board.

Ventilation and Heating.—The fresh air to be taken through galvanized iron pipes to heating coil-chamber in the sub-basement, at the foot of the several ducts leading to each of the rooms above. No more than three rooms to be supplied by each coil-chamber. The foul air to be removed from each room through the bottom of the door into the corridor, from which it is to be removed by twenty ducts in each wing, running separate and distinct through the roof to the outer air. Each duct to be supplied with steam-pipe for purposes of heating, to promote upward draft of foul air, said heating to be done separately from any other heating. Approved by the Board.

The rooms to be heated with warm, fresh air, as stated above. The basement to be heated by direct heat with fresh-air inlets under the radiators. Galvanized iron pipes to be used to bring fresh air to heating surfaces. Approved, with the exception of supplying the fresh air to the basement; and the Board understands that that method is the best that can be adopted, by reason of the expense; while the method is not the best, it may answer for rooms not used so much as those above them.

Location of Hospital.—The hospital is to be located in the wing, the Board is informed, because of the lack of money with which to build a separate hospital. The ventilation of the hospital is said to be entirely distinct from the ventilation of the other portion of the wing in which it is to be located, the foul air of the hospital rooms to be withdrawn immediately by a separate duct and flue.

No copies of plans were presented to this Board to be placed on file, and no statement of the dimensions, location, proposed uses, etc., written out at length, was presented.

HOSPITAL AT THE MICHIGAN ASYLUM FOR THE INSANE.

Letters from the superintendent of the asylum, transmitting the plans, contained the following explanatory statements:

The building is to be mainly heated by steam at low pressure. During spring and fall coal fires will be used in the grates. The fresh air is to be introduced into the coil-chamber (where it is warmed) through trunk flues running through the basement and opening externally at three points of compass. The heating will be indirect, except in the recess of the large dormitories. The warm-air flues open on the halls near the floor. The fresh air will enter the rooms by means of transoms over the doors. The out-let flues are in the rooms (large rooms containing two, while the smaller rooms contain but one) near the floor and ceiling. The fresh-air inlets are 8 by 12 inches; the outlet-flues 8 by 10 inches. The ventilating (outlet) flues are carried separately to the attics, where they are grouped and carried by means of chimneys through the roof. There are to be two fire places or grates on each hall, which will promote ventilation, as well as the comfort of patients.

Upon examination, the drawing sent with the plan was found to show three outlet-flues for foul air *united in one* in the attic, and carried through the roof. This Board recommends that the flues be not united, but actually carried separate and distinct in groups or stacks through the roof and higher than the ridgepole; and that provision be made for heat to each foul-air shaft

by special heating apparatus for ventilating purposes. With these exceptions the plans for ventilation were approved. No details of plans for drainage, sewerage, or plumbing were submitted.

HOSPITAL FOR THE STATE PUBLIC SCHOOL.

The tile-drainage system on the outside of the building foundation was approved, with the understanding that it was to carry surface-water and water from the roof only.

The plan to have for water-closets "the Jennings, Niagara, or some other automatic flushing closet," was approved.

"All bath-tubs, wash-stands, and water-closet traps will be ventilated by pipe through the roof." Approved.

The plan to extend the iron soil-pipe full size, through the roof, is approved.

The sewer-pipe running nearly the entire length of the building is objectionable, and there is no specification as to its joints, or whether it is accessible in the basement.

The following resolution was adopted by the Board :

"Resolved, That the plans as submitted appear to provide for heating and the introduction of fresh air in a satisfactory manner. The ventilation, however, is extremely unsatisfactory, especially in that it provides for the removal of the foul air from many rooms into one common duct. This Board can not recommend such a structure for hospital purposes for such an institution as the Coldwater school, because a much simpler, inexpensive, and superior method is possible by the pavilion plan. The plans show dormitories for the common use of many, and do not show such an arrangement of rooms as would make it possible to isolate patients from others sick with other diseases."

In reply to the letter transmitting this opinion of the State Board of Health, Hon. C. D. Randall, Secretary of the Board of Control of the State Public School, wrote that the building was to be not a hospital, but a dormitory; and August 10, 1883, he wrote, "Each room will have, as you have suggested, separate, distinct ventilating-ducts passing out the roof separately, and they will be heated by steam-pipes securing the outflow of foul air. The sick-rooms will be ventilated by fireplace and the two ducts on each side of such flue. No flues from any room will connect with or open into flues from another room."

INDUSTRIAL SCHOOL FOR GIRLS, AT ADRIAN.

The following opinion of the State Board of Health as to plans for this building was duly transmitted to Mrs. A. S. Fuller, president of the Board of Control.

Basement.—The fresh-air inlet-pipes should be of galvanized iron instead of wood, which is liable to shrink and consequently take in basement air. The wooden joists over the radiators should be covered with something safer than tin, in order to insure against fire.

First Floor.—The ventilation of the hospital and attendant's room was approved. The Board would suggest one more ventilating exit-flue for dining-room, to be located distant from others. The ventilation of the matron's room and of the girls' sitting-room was approved. In the lavatory the three foul-air pipes in the walls should be carried in a group, but *separate from each other*, through and above the roof. The Board would suggest that some method of ventilation be provided for the parlor and Board-room. The attendants' dining-room should have at least two foul-air exits. The front doors of the hall should be made to swing outward, in accordance with the laws of the State. The plan shows them to swing in.

Second Floor.—The ventilation of the two rooms for matrons is approved. The Board disapproved the entire plan of ventilating the dormitories and halls. It seems entirely feasible from the appearance of the plans of the walls, to make enough fresh-air shafts to furnish a shaft for each room, the air to be warmed by passing over a steam pipe at its bottom. Then remove the foul air through the corridors, but with increased number of exit-flues. In case the preceding plan is not available, the foul-air ducts could be arranged in the outside walls so as to remove the foul air from each room if such foul-air duct is heated; the fresh air to be introduced in sufficient quantity in the corridors. If the foul-air shafts are placed in the outside walls they will have to be heated by a stack steam pipe. If it is not thought practicable to have the foul-air ducts in the outside walls they may be made of tin and placed in the partitions between the walls of the rooms, and in the attic gathered in groups of four, which group may be made to run through a chamber heated by a radiator, thence through the roof and above the ridgepole. Whatever method is adopted, each room should have either a fresh-air supply entirely distinct from any other room, or each room should have a foul-air duct which should be entirely distinct and continue unbroken through the roof to the outside air.

Third Floor.—If the third floor is to be used for "strong rooms" and dormitories, more provision should be made for stair-cases; and the same system of ventilation and heating should be adopted as on the second floor.

(In addition, I would respectfully suggest that the supply-pipes for water to be used for cooking and drinking should not be of lead, as proposed in the specifications, but of iron, because of the liability to have lead-poisoning if lead is used. This last item, however, was not formally acted upon by the Board.—*Henry B. Baker, Secretary.*)

ADDITIONAL BUILDING FOR SCHOOL FOR DEAF AND DUMB.

June 21, 1883, by request of the president of the State Board of Health, the secretary attended, at Flint, a conference of the State Board of Charities, the Board of Trustees of the School for the Deaf and Dumb, and the Governor, to examine plans for a proposed additional building for the School for the Deaf and Dumb at Flint. On account of objections made to the plans presented, the Board of Control ordered new plans to be made throughout embodying suggestions made. The new plans were submitted for examination at a meeting of the State Board of Health held at Muskegon, August 24, 1882, in connection with the sanitary convention held there, and were explained by James C. Willson, M. D., of the Board of Trustees. The plans were approved, but it was recommended that provision be made for more ventilation of the dining-room, by placing an exit for foul air at some point distant from the exit shown on the plan.*

August 28, 1883, D. R. Waters, warden of the State House of Correction, at Ionia, by letter requested that a committee from the State Board of Health meet the Board of Managers of the House of Correction, September 4, and make suggestions or submit plans for improvements in ventilation of the shops of that institution. In response to this request, Dr. Avery, of Greenville, president of this Board, and its committee on "Buildings, public and private, including ventilation, heating, etc.," inspected the shops Sept. 4, and wrote out suggestions for improved ventilation, in duplicate reports to the warden and to this Board, printed on pages 29-30 of this volume.

PRINCIPAL METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1882.

A COMPILATION OF REPORTS BY OBSERVERS FOR THE
STATE BOARD OF HEALTH AND FOR THE
UNITED STATES SIGNAL SERVICE.

BY THE SECRETARY OF THE STATE BOARD OF HEALTH.

For each of the years 1877 to 1881, inclusive, there has been published in the Annual Reports of this Board a summary relative to the principal meteorological conditions as observed for the year. This paper continues the subject for the year 1882. The names of the observers for 1882, and the months for which copies of their registers of meteorological conditions were received from each are stated in Exhibit 11, page 122. In Exhibit 12, page 123, is given the latitude, longitude, and elevation of each station. In the tables which follow, reports received from any observer for less than half the year have not been used. Reports for less than twelve months of the year have not been included in the average line for the localities represented in a given table.

The principal conditions treated in the following tables are temperature and humidity of the air, cloudiness, rainfall, ozone, velocity, and direction of the wind, and pressure of the atmosphere. The tables on each subject are illustrated by diagrams representing to the eye variations in the given condition from month to month through the year, at the several localities represented.

METEOROLOGICAL CHARACTERISTICS FOR THE YEAR 1882.

At the State Agricultural College, near Lansing, the average temperature for 1882 was 1.16° lower than for 1881, and $.76^{\circ}$ higher than the average for the preceding 18 years; the annual range of temperature was 18° less than in 1881, and 15° less than the average annual range for the preceding 9 years; the average monthly range of temperature was 3° less than in 1881, and 8° less than the average for the 9 preceding years; the average daily range of temperature was 1.13° less than in 1881, and 2.21° less than the average for the preceding 8 years; the average cloudiness was two per cent greater than in 1881, and one per cent. greater than the average for the preceding 18 years; the rainfall (rain and melted snow) was 2.08 in. less than in 1881, and 1.36 in. greater than the average for the preceding 18 years; the average atmospheric pressure for the year 1882 was .007 in. greater than in 1881, and .052 in. greater than the average for the preceding 7 years. In Exhibit 13, pages 124, is given by year and months a comparison of conditions in 1882, at the Agricultural College, with those in 1881, and with averages for periods of

years. February, October, March, January, November, and August (naming months in order of greatest difference) were months in which the average tem-

EXHIBIT 11.—*Names of observers whose Reports are summarized in the following Meteorological Tables and Diagrams, their Places of Observation, and the Counties and Geographical Divisions of the State in which these Places are situated, and months for which reports were received from each observer.*

NAME OF OBSERVER.	Place of Observa- tion.	County.	Divi- sions of the State.*	Months (Inclusive) for which Registers were Received.
J. Gilligan, Sergeant Signal Corps, U. S. A.	Marquette.....	Marquette..	U. P.	Jan. to Dec.
Charles Dill, Sergeant Sig- nal Corps, U. S. A.	Escanaba.....	Delta.....	U. P.	Jan. to July.
George Heathcote, Private, Signal Corps, U. S. A.	Escanaba.....	Delta.....	U. P.	Aug. to Dec.
Charles S. Hampton.....	Harbor Springs.....	Emmet.....	N.	Feb.
H. T. Calkins, M. D.....	Peteskey.....	Emmet.....	N.	Jan.
S. E. Wait.....	Traverse City.....	G. Traverse.	N. W.	Jan. to Dec.
James J. FitzGerald, Sergt. Signal Corps, U. S. A.	Alpena.....	Alpena.....	N. E.	Jan. to Dec.
J. E. Fair.....	Harrisville.....	Alpena.....	N. E.	Jan. to Dec.
W. A. Reid, Sergt. Signal Corps, U. S. A.	Grand Haven.....	Ottawa.....	W.	Jan. to Oct.
Joseph E. Mueller, Sergt. Signal Corps, U. S. A.	Grand Haven.....	Ottawa.....	W.	Nov. to Dec.
E. S. Richardson, M. D.....	Reed City.....	Osceola.....	W.	Jan. to Dec.
J. W. Kimball.....	Port Austin.....	Huron.....	B. & E.	May to Nov.
W. O. Bailey, Sergt. Signal Corps, U. S. A.	Port Huron.....	St. Clair.....	B. & E.	Jan. to Dec.
John S. Caulkins, M. D.....	Thornville.....	Lapeer.....	B. & E.	Jan. to Dec.
Prof. R. C. Kedzie.....	Agricult'l College, near Lansing.....	Ingham.....	C.	Jan. to Dec.
Fred Sweet.....	Hastings.....	Barry.....	C.	Jan. to Dec.
Col. C. E. Watkins, Warden	{ State House of } { Correct'n, Ionia }	Ionia.....	C.	Jan. to Apr.; June to Dec.
Rev. J. Pierson, D. D.....	Ionia.....	Ionia.....	C.	Aug. to Dec.
Harry B. Turner.....	Office State B'd of Health, Lansing..	Ingham.....	C.	Jan. to Nov. 19.
Erwin F. Smith.....	Office State B'd of Health, Lansing..	Ingham.....	C.	Nov. 20 to Dec.
Mrs. M. M. Nicholson.....	Otisville.....	Genesee.....	C.	Jan. to Dec.
Lee S. Cobb.....	Winfield.....	Ingham.....	C.	Jan. to Dec.
James S. Reeves, M. D.....	Niles.....	Berrien.....	S. W.	Jan. to Aug.
Prof. M. W. Harrington.....	University of Mich- igan, Ann Arbor..	Washtenaw.	S. C.	Jan. to Dec.
J. H. Kellogg, M. D.....	Battle Creek.....	Calhoun.....	S. C.	Jan. to Dec.
F. D. Parmelee.....	Hillsdale.....	Hillsdale.....	S. C.	Jan. to Dec.
Orrin Dean, Jr.	Hudson.....	Lenawee.....	S. C.	Jan. to April.
Geo. C. Palmer, M. D., Supt.	Asylum for Insane, Kalamazoo.....	Kalamazoo..	S. C.	Jan. to Dec.
W. T. Drake.....	Marshall.....	Calhoun.....	S. C.	Jan. to Dec.
Edwin Stewart, M. D.....	Mendon.....	St. Joseph..	S. O.	Jan. to Dec.
Lewis Marvill.....	Parkville.....	St. Joseph..	S. O.	Jan. to Dec.
L. G. North, M. D.....	Tecumseh.....	Lenawee.....	S. O.	Jan. to Dec.
O. F. E. Wappenhans, Sergt. Signal Corps, U. S. A.	Detroit.....	Wayne.....	S. E.	Jan. to Dec.
Albert Yates, M. D.....	Washington.....	Macomb.....	S. E.	Jan. to Dec.

* The counties in each division are stated in Exhibit 1, page 5, and in a map on page 113.

perature in 1882 was higher than the average for corresponding months in the preceding 18 years; May, July, June, April, December, and September were months in which the average temperature in 1882 was lower than the average for corresponding months in the preceding 18 years.

EXHIBIT 12.—*Latitude and Longitude, Elevation above Sea Level, and the Average Temperature, and Average Barometric Pressure in 1882, at 25 Meteorological Stations in Michigan,—the names of the Stations being arranged in order by latitude, highest first.*

LOCALITIES IN ORDER OF LATITUDE,—THOSE FARTHEST NORTH, FIRST.	Latitude North.	Longitude West from Greenwich.	Altitude (Approximate) above Sea Level,— Feet.	Height of Mercury in Cistern of Barometer above Sea Level,— Feet.	Average Tempera- ture, 1882. Degrees Fahr.	Average At- mospheric Pressure, 1882. Inches of Mercury corrected for Tem.
Marquette.....	46°33'	87°36'	638.07	673.	42.28	29.283
Escanaba.....	45°46'	87°14'	* 594.693	615.193	42.76	29.342
Alpena.....	45°5'	83°28'	587.9	609.5	42.68	29.360
Traverse City.....	44°45'	85°40'	598.	602.5	45.13	29.365
Harrisville.....	44°39'	83°18'	-----	-----	44.62	29.340
Port Austin.....	44°	82°	474.	-----	-----	-----
Reed City.....	43°44'	85°28'	1,016.	1,022.	45.63	28.872
Otisville.....	43°13'	83°31'	890.	-----	47.21	28.991
Grand Haven.....	43°5'	86°18'	595.3	616.3	48.18	29.354
Ionia.....	† 42°58'	† 85°4'	688.1	-----	-----	-----
Port Huron.....	42°58'	82°29'	600.	630.	45.78	29.346
Thornville.....	* 42°55'	* 83°12'	|| 975.	980.	49.02	* 29.033
Lansing.....	‡ 42°44'	‡ 84°33'	§ 900.	d 917.	49.23	29.041
Hastings.....	* 42°40'	* 85°17'	§ 750.	-----	47.94	29.194
Washington.....	42°40'	83°	746.33	752.33	46.85	29.289
Winfield.....	* 42°30'	* 84°34'	-----	-----	47.82	-----
Detroit.....	42°20'	83°2'	ε 602.6	ε 661.43	51.20	29.288
Battle Creek.....	* 42°20'	* 85°11'	§ 800.	-----	50.20	28.458
Kalamazoo.....	42°18'	85°35'	975.	f 996.	48.69	29.121
Ann Arbor.....	42°17'	a	930.	936.	47.31	29.054
Marshall.....	42°17'	84°58'	885.	888.	49.58	-----
Mendon.....	* 42°2'	* 85°29'	§ 871.	-----	48.91	29.098
Parkville.....	b	b	-----	-----	48.57	-----
Tecumseh.....	* 42°1'	* 83°57'	835.	837.5	48.06	29.148
Hillsdale.....	¶ 41°55'	¶ 84°34'	§ 139.	-----	47.70	28.829

* Estimated from lines on a map of Michigan issued by the General Land Office, Department of the Interior, 1878. For stations having no reference mark, the latitude and longitude were stated by the observer on the meteorological reports received.

† The exact latitude and longitude of the astronomical post at Ionia is 42°58' 52.53" N. and 85°3' 49.20" W.

‡ The exact latitude and longitude of the astronomical post placed in the ground near the new Capitol at Lansing, by the U. S. Lake Survey in 1875, as determined by the observations then made, is 42°43' 53.11" N. and 84°33' 19.68" W.

§ Estimated from data on "Railroad Profiles," pages 179-187, Annual Report of the State Board of Health for 1878.

|| Estimated from data in Tackabury's Atlas of the State of Michigan.

¶ By table in Tackabury's Atlas of Michigan.

a 6°41' west from Washington, which is about 70°3' west from Greenwich.

b 3½ miles west from Mendon.

c Aneroid Barometer.

d Estimated from comparisons of barometrical observations at Lansing, Port Huron, and Grand Haven, for the four years 1879-82.

e The elevation of ground at Escanaba is stated at 596.86 ft. on the monthly registers from Dec., 1881, to June, 1882, inclusive; on registers for other months of 1882 it is stated as 594.693.

f The elevation of barometer at Kalamazoo is stated as 996 ft. from Jan. to June, inclusive; not stated on registers for July, Aug., and Sept., and is stated as 987 ft. in registers for Oct., Nov., and Dec.

g The signal office at Detroit was moved Feb. 7, 1881. Before that the elevation of ground was 683.3 ft., of barometer 635 ft. Beginning with the first observation Feb. 8, 1881, and since, the elevations have been, of ground 602.6 ft., of barometer 661.43 ft.

EXHIBIT 13.—*Statements of Meteorological Conditions in the Year and in each Month of the Year 1882. Compared with Annual and Monthly Averages for 1881 and for several Stated Periods of Years,—from observations by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.†*

METEOROLOGICAL CONDITIONS.	1882 COMPARED WITH AVERAGES FOR PREVIOUS Y'RS.			In 1882 More (+), or Less (-), than in 1881.	METEOROLOGICAL CONDITIONS.	1882 COMPARED WITH AVERAGES FOR PREVIOUS Y'RS.			In 1882 More (+), or Less (-), than in 1881.
	No. of Years Averaged, ending with 1881.	More (+), or Less (-), in 1882 than the Average for Previous Years.				No. of Years Averaged, ending with 1881.	More (+), or Less (-), in 1882 than the Average for Previous Years.		
YEAR 1882.					YEAR 1882.				
Av. Temp.....	18	+ .76°	-1.16°		<i>Continued.</i>				
Range of Temp.*	9	-15°	-18°		Cloudiness.....	18	+ 1 per ct.	+ 2 per ct.	
Av. Monthly Range of Temp.*	9	-8°	-3°		Rainfall.....	18	+ 1.36 in.	-2.06 in.	
Av. Daily Range of Temp.*	8	-2.21	-1.13		Atmospheric Pressure.....	7	+ .062 in.	+ .007 in.	
JANUARY.					FEBRUARY.				
Av. Temp.....	18	+ 2.15°	+ 7.91°		Av. Temp.....	18	+ 10.86°	+ 13.54°	
Range of Temp.*	9	-6°	+ 6°		Range of Temp.*	9	-14°	-20°	
Av. Daily Range of Temp.*	8	-.03°	-2.25°		Av. Daily Range of Temp.*	8	-.42°	-1.25°	
Cloudiness.....	18	0 per ct.	+ 7 per ct.		Cloudiness.....	18	-8 per ct.	-12 per ct.	
Rainfall.....	18	-.80 in.	-1.10 in.		Rainfall.....	18	+ .49 in.	-1.49 in.	
Atmospheric Pressure.....	7	+ .073 in.	+ .067 in.		Atmospheric Pressure.....	7	-.003 in.	-.111 in.	
MARCH.					APRIL.				
Av. Temp.....	18	+ 4.22°	+ 5.68°		Av. Temp.....	18	-1.19°	-.89°	
Range of Temp.*	9	-11°	+ 9°		Range of Temp.*	9	-11°	-22°	
Av. Daily Range of Temp.*	8	-.99°	+ 2.00°		Av. Daily Range of Temp.*	8	-3.34°	-2.86°	
Cloudiness.....	18	+ 4 per ct.	+ 1 per ct.		Cloudiness.....	18	+ 1 per ct.	+ 8 per ct.	
Rainfall.....	18	+ .89 in.	+ .92 in.		Rainfall.....	18	-.72 in.	+ .15 in.	
Atmospheric Pressure.....	7	+ .125 in.	+ .199 in.		Atmospheric Pressure.....	7	+ .100 in.	+ .024 in.	
MAY.					JUNE.				
Av. Temp.....	18	-6.14°	-12.51°		Av. Temp.....	18	-1.52°	+ 2.18°	
Range of Temp.*	9	-9°	-5°		Range of Temp.*	9	-11°	-3°	
Av. Daily Range of Temp.*	8	-5.01°	-4.00°		Av. Daily Range of Temp.*	8	-4.11°	-.60°	
Cloudiness.....	18	+ 8 per ct.	+ 16 per ct.		Cloudiness.....	18	+ 3 per ct.	-5 per ct.	
Rainfall.....	18	+ 1.10 in.	+ 1.93 in.		Rainfall.....	18	+ 1.66 in.	+ 1.20 in.	
Atmospheric Pressure.....	7	+ .013 in.	-.051 in.		Atmospheric Pressure.....	7	-.049 in.	-.059 in.	
JULY.					AUGUST.				
Av. Temp.....	18	-1.28°	-5.72°		Av. Temp.....	18	+ .18°	-3.17°	
Range of Temp.*	9	-7°	-1°		Range of Temp.*	9	-14°	-14°	
Av. Daily Range of Temp.*	8	-5.36°	-2.68°		Av. Daily Range of Temp.*	8	-7.72°	-5.52°	
Cloudiness.....	18	-3 per ct.	+ 6 per ct.		Cloudiness.....	18	+ 7 per ct.	+ 14 per ct.	
Rainfall.....	18	-1.02 in.	+ .51 in.		Rainfall.....	18	+ 3.00 in.	+ 4.09 in.	
Atmospheric Pressure.....	7	+ .049 in.	+ .003 in.		Atmospheric Pressure.....	7	+ .007 in.	-.055 in.	

* By registering thermometers, set at 7 A. M., and recorded at 7 A. M. for the preceding calendar day.

† For November and December, 1879, and January, 1881, the observations were made by Harry B. Turner, at the office of the State Board of Health, Lansing.

EXHIBIT 13.—CONTINUED —*Meteorological Conditions in Months for the Year 1882, Compared with Averages for Corresponding Months in Preceding Years.*

1882 COMPARED WITH AVERAGES FOR PREVIOUS Yr's.				1882 COMPARED WITH AVERAGES FOR PREVIOUS Yr's.			
METEOROLOG- ICAL CONDITIONS.		No. of Years Aver- aged, end'g with 1881.	More (+), or Less (-), in 1882 than the Average for Previous Years.	METEOROLOG- ICAL CONDITIONS.		No. of Years Aver- aged, end'g with 1881.	More (+), or Less (-), in 1882 than the Average for Previous Years.
In 1882 Less (-), than in 1881.				In 1882 Less (-), than in 1881.			
SEPTEMBER.				OCTOBER.			
Av. Temp.....	18	-40°	-9.71°	Av. Temp.....	18	+4.46°	+ .16°
Range of Temp.*	9	-5°	-1°	Range of Temp.*	9	-6°	+8°
Av. Daily Range of Temp.*	8	-2.04°	-.03°	Av. Daily Range of Temp.*	8	+3.75°	+3.62°
Cloudiness.....	18	-7 per ct.	-7 per ct.	Cloudiness.....	18	-9 per ct.	-17 per ct.
Rainfall.....	18	-2.34 in.	-2.24 in.	Rainfall.....	18	+.19 in.	-2.92 in.
Atmospheric Pressure.....	7	+1.03 in.	+.109 in.	Atmospheric Pressure.....	7	+0.44 in.	-.069 in.
NOVEMBER.†				DECEMBER.†			
Av. Temp.....	18	+1.18°	-1.90°	Av. Temp.....	18	-.69°	-9.51°
Range of Temp.*	9	+1°	+4°	Range of Temp.*	9	-5°	+6°
Av. Daily Range of Temp.*	8	+1.13°	+.40°	Av. Daily Range of Temp.*	8	-1.47°	0
Cloudiness.....	18	+8 per ct.	+1 per ct.	Cloudiness.....	18	+10 per ct.	+19 per ct.
Rainfall.....	18	-.34 in.	-2.26 in.	Rainfall.....	18	-.99 in.	-.87 in.
Atmospheric Pressure.....	7	+.111 in.	+.055 in.	Atmospheric Pressure.....	7	+.046 in.	-.022 in.

* By registering thermometers, set at 7 A. M., and recorded at 7 A. M., for the preceding calendar day.

Comments on Exhibit 13 are printed on page 121. The high temperature in February, the low temperature in May, and the great rainfall in August are especially noticeable.

The following general remarks relative to temperature, frosts, effects on vegetation, migration of birds, etc., in 1882, are taken from the monthly reports by observers. The names of observers are stated in Exhibit 11, page 122.

JANUARY.

A quite pleasant winter month, at least 5° warmer than the long average; no sleighing, and small precipitation. As the month closes, the ice in the ponds is 10 inches thick; frost in the ground in the open fields, about 18 inches deep.—*Thornville*.

Ground frozen 8 inches. Frosts Jan. 1, 2, 12, 17, 20, 21, 23, 24, 28, 30, 31. Melting snow on ground, Jan. 7, 8, 9, 10, 11, 13, 15, 20, 21, 25, 26, 28, 30, 31.—*Alpena*.

Frost on Jan. 9, 12, 26.—*Lansing*.

Frosts, Jan. 2, 10, 12, 16, 27. No snow on ground at end of month.—*Detroit*.

FEBRUARY.

Mornings with white frost, Feb. 2, 3, 5, 6, 8, 9, 11, 14, 15, 25. Nights that no ice formed, 7, 12, 13, 16, 27, 28. A warm and pleasant month for the season, with no sleighing, and noteworthy for the 6 days without freezing. Wheat seems not to be in the least injured by the freezing and thawing lack of snow, but looks excellent. As the month goes out there is not a particle of ice in sight, and little frost in the ground. Robins came back as early as Feb. 22, and bluebirds soon after. Blue flies and mosquitoes have been seen.—*Thornville*.

Robins and other spring birds returned Feb. 6.—*Parkville*.

Navigation open on Feb. 16th, and closed again on Feb. 21st. Ground frozen 4 inches. Melting snow on ground on Feb. 1, 7, 24, 25, 26, 27, 28.—*Alpena*.

A very pleasant month. Little Traverse bay was closed with drift ice on the last of January. Men on foot crossed Jan. 30. The month opened with excellent sleighing, which continued until about the middle of the month, when it became very poor where exposed to the sun. The ice in the harbor, which was not completely frozen over until Feb. 4th, has attained a thickness of about

10 inches, but the frequent warm spells of weather have badly "honey-combed" it.—*Harbor Springs.*

Frosts on Feb. 3, 4, 5, 6, 8, 9, 10. Snow entirely disappeared on Feb. 23.—*Hastings.*

Frost Feb. 9. River opened Feb. 13, closed Feb. 21, and opened again Feb. 25. Robins came back Feb. 22.—*Lansing.*

Dates of frosts, Feb. 2, 5, 6, 8, 9, 14, 15. No snow on ground at end of month.—*Detroit.*

MARCH.

Trees loaded with ice Mar. 5th. Return of meadow larks, Mar. 22; barn-swallows and kill-deer plovers, Mar. 25. Hazel-bushes in blossom Mar. 25, frogs heard Mar. 22. March, in spite of some cold weather, has been a warmish month. As it closes there is scarcely any ice in the ground. Wheat looks uncommonly well, but the last year's seeding of clover is pretty much all killed by the repeated freezings. A great month for making maple sugar. No sleighing.—*Thornville.*

Frost Mar. 13, 19.—*Hastings.*

Frost Mar. 30.—*Marshall.*

Navigation opened on Mar. 2. Floating ice in bay and river Mar. 2. Melting snow on ground Mar. 5, 6, 10, 18, 23.—*Alpena.*

Frost disappeared from ground Mar. 4. Ground froze Mar. 22. Frost disappeared from ground Mar. 29. Frost on Mar. 13, 19, 30.—*Lansing.*

Frosts Mar. 14, 17. No snow on ground at end of month.—*Detroit.*

APRIL.

Frost occurred on April 15, 16, 17, 29.—*Hastings.*

Cat birds and brown thrushes came back about the middle of the month. A dry month, with a good deal of cold weather, considering how warm the year began; still the temperature is fully

EXHIBIT NO. 14.—*Depth of Wells; Depth of Ground above Water in Well; Temperature 1882, as reported by Meteorological Observers for the State*

STATIONS IN MICHIGAN.	JANUARY.			FEBRUARY.			MARCH.			APRIL.			MAY.		
	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.
Marquette.....	* 10 6	33 ¹⁵	10 6	32.3	4	†	10 8	36 ¹⁵	10 8	42.5	15				
Reed City.....	18 10	39 ¹⁶	18 10	40	20	18 10	37 ¹⁶	18 10	40	25	18 10	40	13		
Thornville.....	20 17 6	43 ¹⁵	20 17 6	49	15	20 16 11	42 ¹⁹	20 16 6	44	17	20 16 4	45	16		
Hastings.....	7 5	40 ²⁸	7 4	40	23	7 4	42 ¹⁹	7 4	48	16					
Ionia.....															
Niles.....			29 8 8	52	15	44 10	40 4	52 ¹⁵							
Battle Creek.....	80	53 ²⁶	80	42	23	80	50 ²⁸	80	50 ²³	80	50 ²⁴	50 ²⁴	50 ²⁴	50 ²⁴	24
Hilledale.....			27 17 10	48	15	27 17 2	47 ¹⁵	27 17 6	46	15	27 17 10	46	15		
Hudson.....	37 33	52 ¹⁶	37 33	50	17										
Kalamazoo.....	24 21	49 ¹⁶	24 16	50	13	24 21 6	49 ¹⁶	24 22	49	14	24 19 6	50	15		
Mendon.....	19	58 ¹⁸	19	50	18	19	49 ¹⁹	19	49	16	19	49	14		
Parkville.....	22 10	48 ¹⁸	22 8	48	14	20 7	46 ¹⁴	22 7	48	18	22 6	49	15		
Tecumseh.....	40 37 6	48 ²¹	40 37 6	48	20	40 36	49 ¹⁶	40 35	50	17	40 33	51	24		

* In Lake Superior at point where observation was taken.

† No observation taken on account of lake being frozen over.

up to the long average. Wheat is hurt by the cold, dry weather, materially, looking on the stubble land very yellow. Early peaches are killed in the bud.—*Thornville*.

Frosts occurred on April 1, 2, 3, 5, 8, 16, 21, 22, 24, 25, 26, 29, 30. Melting snow on ground April 12.—*Alpena*.

Navigation opened on April 7, first vessel arrived on Apr. 8. Frosts on April 1, 8, 14, 15, 16, 21, 22, 23, 24, 25, 26, 30.—*Escanaba*.

Frost occurred April 2, 11, 14, 15, 20, 23, 28. Wild ducks flying north April 1. Ground froze April 9; frost disappeared from ground April 11. Ice formed during night of April 23.—*Langsing*.

Frost April 10, 11, 12, 13, 14, 15, 21, 24, 29.—*Kalamazoo*.

Frosts, April 3, 24, 25. No snow on ground at end of Month.—*Detroit*.

MAY.

Frost occurred on May 2, 15, 16.—*Escanaba*.

Frosts occurred on May 2, 3, 7, 16, 17, 22, 24, 25. Blossoming of June-berries, May 11; sweet cherries, May 14; peaches, May 18; plums, May 19; apples and sour cherries, May 21. A cold, backward month. For all the large rainfall both soil and atmosphere have been very dry; a bad year for corn-planting, but favorable for wheat. Fruit prospects remain good in spite of the severe frosts of the middle of the month.—*Thornville*.

Frosts, May 2, 3, 15, 16, 23.—*Hastings*.

Frosts May 15, 18, 25, 29. Ice formed May 1, 2, 3, 4, 16, 23, 24.—*Ottville*.

Frosts night of May 14, 15, 18, 22, 23, 25, 30. Ground froze one-fourth of an inch deep May 14. Night of May 15, a hard freeze. May 23, a hard frost.—*Winfield*.

Frost, May 16.—*Marshall*.

Frosts May 24 and 25 that injured some fruits, especially grapes and currants.—*Mendon*.

of Water in Well, and Day of observation of such temperature, in each month of the year Board of Health, and for the United States Signal Service.

JUNE.			JULY.			AUGUST.			SEPTEMBER.			OCTOBER.			NOVEMBER.			DECEMBER.		
Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.
10 11	-----	52 ¹⁵	10 6	-----	55 ¹⁶	10 6	-----	61 ¹⁵	10 6	-----	59 ¹⁵	10 6	-----	49.9 ¹⁶	10 6	-----	42 ¹⁵	10 6	-----	36 ¹⁹
18	10	42 ²⁰	18	10	45 ²⁴	18	10	48 ¹⁸	18	10	48 ¹⁵	18	10	49 ¹⁸	18	10	45 ²²	-----	-----	-----
20	16	47 ¹⁵	20	16 3	48 ¹⁷	20	16 6	51 ²⁰	20	16 6	50 ¹⁵	20	16 3	49 ¹⁷	20	16 6	48 ¹⁶	20	16 6	42 ¹⁶
-----	-----	-----	-----	-----	-----	-----	-----	55 ²¹	22 6	20	55 ¹⁶	22 6	20	55 ¹⁶	22 6	20	54 ¹⁵	22 6	20	52 ²⁷
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	80	-----	51 ³¹	75	-----	50 ²⁸	80	-----	50 ³²	80	-----	51 ¹¹	80	-----	49 ¹⁷	80	-----	49 ²⁴
27	17 10	46	27	18 10	48 ¹⁵	27	20 1	48 ¹⁶	27	21 5	49 ¹⁵	27	22 3	50 ¹⁸	27	23 5	46 ¹⁵	27	24 2	50 ¹⁵
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
19	-----	50 ¹⁹	19	-----	52 ¹⁸	19	-----	52 ²⁰	19	-----	54 ¹⁹	19	-----	54 ²²	-----	-----	-----	19	-----	52 ¹³
22	6	51 ¹²	22	6	56 ¹⁷	22	5	58 ¹⁶	22	6	58 ¹⁴	22	6	56 ¹⁸	22	6	54 ¹⁴	22	7	54 ¹⁴
40	35	50 ²⁰	40	35	50	40	36	50 ¹⁶	40	36	51 ¹⁶	-----	-----	51	40	37 6	50 ¹⁸	40	37 6	50 ²⁰

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

Frost on May 16.—*Port Austin.*

Frost, May 2; 15 and 16, light; 23, light; 24 and 25.—*Kalamazoo.*

Frosts, May 2, 16, 23, 24, 29.—*Detroit.*

Heavy frost morning of May 16.—*Agricultural College.*

Frosts, May 2, 3, 15, 16, 17, 18, 24, 25. Ice, May 3, 16, 17, 24.—*Parkville.*

Frost, May 1, 2, 4, 14, 15, 16, 17, 18, 23, 24, 28, 31. Ice, May 14, 15, 31.—*Lansing.*

JUNE.

June is noticeable for the lack of any real hot weather, although not on the whole much behind the long average. The coolness of the nights makes the corn very small, but all other crops promise big, especially wheat. There is a disease among the apple and peach trees that is making great havoc in the orchards.—*Thornville.*

Frost, June 1.—*Parkville.*

Frost, June 6.—*Ottisville.*

Frost, June 6.—*Detroit.*

Frost, June 5, last of the season.—*Lansing.*

JULY.

A cool, dry month. Hay was secured in excellent condition, and was much better than was at one time expected. Wheat harvest was late, cutting having begun about the 21st. Heavy rains set in on the 31st, that have badly damaged the crop.—*Thornville.*

AUGUST.

A very moist, temperate month, with no days of extreme heat, the highest point reached being only 86°; but in spite of this the mean temperature of the month is but slightly below the long average. The wet weather of the first half of the month did less damage to the wheat than was at one time feared, that is, if allowed to dry out thoroughly in the mow before threshed, otherwise it will be apt to hurt by heating in the bin. Since the rains the corn crop has made a wonderful improvement. It is eared unusually well, and if frosts hold off till it hardens, will be a fair crop. It was perhaps never so smutty as it is this year. The smut not only attacks the ears, but grows on the tassels and stalks and even on the roots.—*Thornville.*

SEPTEMBER.

The first frost occurred September 24.—*Marquette.*

Frost, light, the first of the season, September 23.—*Escanaba.*

Frost, morning of September 26.—*Traverse City.*

Heavy frost on the 24th. Light frost on the 26th.—*Alpena.*

Frosty mornings, September 23, 24, 25. A cool, dry month. The late sowed wheat (and that includes most of it) is not coming up well on account of lack of moisture. The prospect is not at present good that wheat can get much of a top before winter. There will be considerable sowed in October. Corn and potatoes have ripened well and are getting harvested. They are good, except a little rot among the latter. Apples are generally of poor quality and not more than half a crop. The migratory birds left early,—barn swallows by the first, fly-catchers the fifteenth, robins and bluebirds soon after, except a few which still remain; yellow birds are still plenty.—*Thornville.*

Frosts, the first, Sept. 23; a hard frost Sept. 24.—*Hastings.*

Frost, light, Sept. 23; heavy, Sept. 24.—*Ottisville.*

Frosts in some low places, but none on or near my ground, Sept. 11. A good frost, Sept. 24, first here.—*Winfield.*

Frost, Sept. 24.—*Marshall.*

Frost, Sept. 23, 24, 26.—*Parkville.*

Hoar frost, Sept. 23, 24, 26.—*Ionta.*

Frost, September 23, 23; first observed.—*Lansing.*

OCTOBER.

Frosts, light, October 17, 18, 19, 21, 26.—*Escanaba.*

Frosts on the nights of October 10, 20, 23.—*Traverse City.*

Frosts, October 14, 15, 18, 20, 21, 24, 26, 28.—*Alpena.*

Frosts, light, Oct. 15, 25; heavy, Oct. 20, 24, 26, 28. A dry, pleasant month, with very little wind. The first frost that killed vegetation was on the 20th. Some birds,—robins and bluebirds,—came back and stayed around the whole month. Growing wheat looks poor, being small and badly damaged by the Hessian fly. Corn matured excellently well, and is a large crop. Apples are not half a crop, and poor in quality, gnarly and wormy.—*Thornville.*

Frosts, first on Oct. 18, also on Oct. 20, 21, 23, 24, 25, 26, 28.—*Hastings.*

The first severe frost occurred Oct. 20; ice formed one-eighth of an inch thick.—*Ottisville.*

Frosts Oct. 19, 20; heavy frosts Oct. 23, 24.—*Battle Creek.*

Heavy frost this morning, Oct. 18.—*Hillsdale.*

Frosts Oct. 14, 15, 18; frost and ice Oct. 19.—*Parkville.*

Frosts, first of season on Oct. 10; also 17. First freeze Oct. 19, again Oct. 20.—*Tecumseh.*

Frost, first of season, on the night of Oct. 17.—*Washington.*

Frost, light, morning Oct. 20. Oct. 31, very fine weather, like May. Have had but two slight frosts yet.—*Port Austin.*

Hoar frosts occurred on Oct. 18, 20, 21, 24, 26, 28; thin ice observed at 7 A. M., on Oct. 20, 24, 28. Ground froze very little depth, Oct. 24.—*Ionia.*

Frost Oct. 20 and 24.—*Kalamazoo.*

Frosts October 14, 16, 18, 20, 21, 24, 25, 26.—*Detroit.*

Frosts Oct. 13, 17, 19, 20, 24, 26, 28.—*Lansing.*

NOVEMBER.

Frosts, Nov. 4, 9, 10, 13, 17, 18, 21, 24 to 30.—*Escanaba.*

Frosts occurred on Nov. 1, 3, 8, 10, 17, 18, 19, 20, 21, 23, 25, 28. Melting snow on ground Nov. 16, 23, 24, 25, 26, 27.—*Alpena.*

A dry, cloudy month, little frost in the ground. Good mean temperature; wintry at last.—*Thornville.*

White frost, Nov. 4.—*Kalamazoo.*

Frost Nov. 3, 5, 8, 16, 18, 19, 25. Ground frozen for the first time this season, Nov. 13.—*Lansing.*

Frosts Nov. 1, 2, 4, 5, 8, 15, 18, 19, 20, 21. Depth of unmelted snow on ground at end of month .03 inch.—*Detroit.*

Hoar frosts Nov. 1, 2, 4, 5, 8, 18, 20, 25. Ice, Nov. 1, 2, 4, 5, 13, 14, 15, 18 to 21, 24 to 25, 27 to 30, one-eighth to three-fourths inch thick. Ground frozen Nov. 4, 14, 18, 20, 21, 25, 28, three-fourths to one and one-eighth inch. Melting snow on ground Nov. 27.—*Ionia.*

DECEMBER.

Frosts Dec. 2 to 11, 13 to 15, 17, 18, 23 to 31. Bay frozen Dec. 10, 11, 16 to 31. Navigation closed Dec. 7.—*Escanaba.*

Frost occurred on Dec. 5, 7, 8, 9, 11, 12, 13, 14, 18, 19, 24, 27, 29. Melting snow on ground Dec. 1, 4, 5, 10, 12, 13, 18 to 30. Ground frozen 8 inches. Navigation closed Dec. 10.—*Alpena.*

Heavy white frost Dec. 18. A very cloudy month, with high barometric pressure. Except two or three days there has been no extreme cold weather; some snow, but little sleighing. As the month closes the ground is almost bare, the snow being all blown into heaps. Ice in the ponds is 5 or 6 inches thick. Frost in the ground about 2 inches in the open, none in the woods. Wheat on the ground needs covering with snow.—*Thornville.*

Frost, Dec. 29.—*Hastings.*

No break-up since first freezing, Jan. 1, 1883.—*Hillsdale.*

River frozen over Dec. 2. Hoar frost morning of Dec. 18. Rain turning to ice in night, Dec. 19.—*Lansing.*

Frosts Dec. 5, 19, 22, 26, 29, 30, 31. No snow on ground at end of month.—*Detroit.*

Ice Dec. 1, thin; 2, 4, 5, 6, 7, 8. Frozen ground Dec. 1, 2, 3, 4, 5, 6, 7, 8. Melting snow Dec. 12, 13, 20, 21, 22, 26 to 29. Ice 10 inches thick from Dec. 8 to end of month.—*Ionia.*

TEMPERATURE.

Compared with the average for the preceding 18 years at the Agricultural College, the mean temperature in January, February, March, and October, 1882, was high; in May and July it was low. The evidence may be found in Exhibit 15, page 130. By Exhibit 17, page 132, it appears that in 1882 the mean temperature in January, February, and March was much higher than in those months in 1881; in May, July, September, and December it was much lower. By Exhibit 17, page 132, it also appears that February, 1882, was much warmer than the average February temperature for the six years 1877-82, and May, 1882, much colder than the average May temperature for those years. By Exhibit 16, page 130, it also appears that February, 1882, was unusually warm and May unusually cold.

By Exhibit 18, page 136, it appears that the lowest temperature reached in February, March, August, and November, 1882, was considerably above the average lowest for the preceding nine years, and that in December, 1882, the highest and the lowest temperatures were considerably below the average highest and lowest for those years. By this exhibit neither so high nor so low a temperature seems to have been reached in 1882 as usual in previous years.

EXHIBIT 15.—*Comparison of the Average Temperature during the Year and during each Month of the Year 1882, with the Annual and with the Monthly Averages for the Year 1881, and with the Averages for the Eighteen Years 1864-1881. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

YEARS, ETC.	AVERAGE (MEAN) TEMPERATURE.—DEGREES FAHR.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 18 yrs., 1864-81.	46.81	22.74	24.26	31.74	45.89	58.87	68.01	71.99	69.34	60.38	48.21	35.12	25.49
1881.....	48.73	16.98	21.58	30.28	45.59	65.24	64.31	73.43	72.69	69.69	52.51	38.20	34.31
1882.....	47.57	24.89	35.12	35.96	44.70	52.73	66.49	67.71	69.52	59.98	52.67	36.30	24.80
In 1882 High- er than Av. 18 yrs.—1864-81.	.76	2.15	10.86	4.22	-----	-----	-----	-----	.18	-----	4.46	1.18	-----
In 1882 Lower than Av. 18 yrs.—1864-81.	-----	-----	-----	-----	1.19	6.14	1.52	4.28	-----	.40	-----	-----	.69
In 1882 High- er than in 1881.....	-----	7.91	13.54	5.68	-----	-----	2.18	-----	-----	-----	.16	-----	-----
In 1882 Lower than in 1881.	1.16	-----	-----	-----	.89	12.51	-----	5.72	3.17	9.71	-----	1.90	9.51

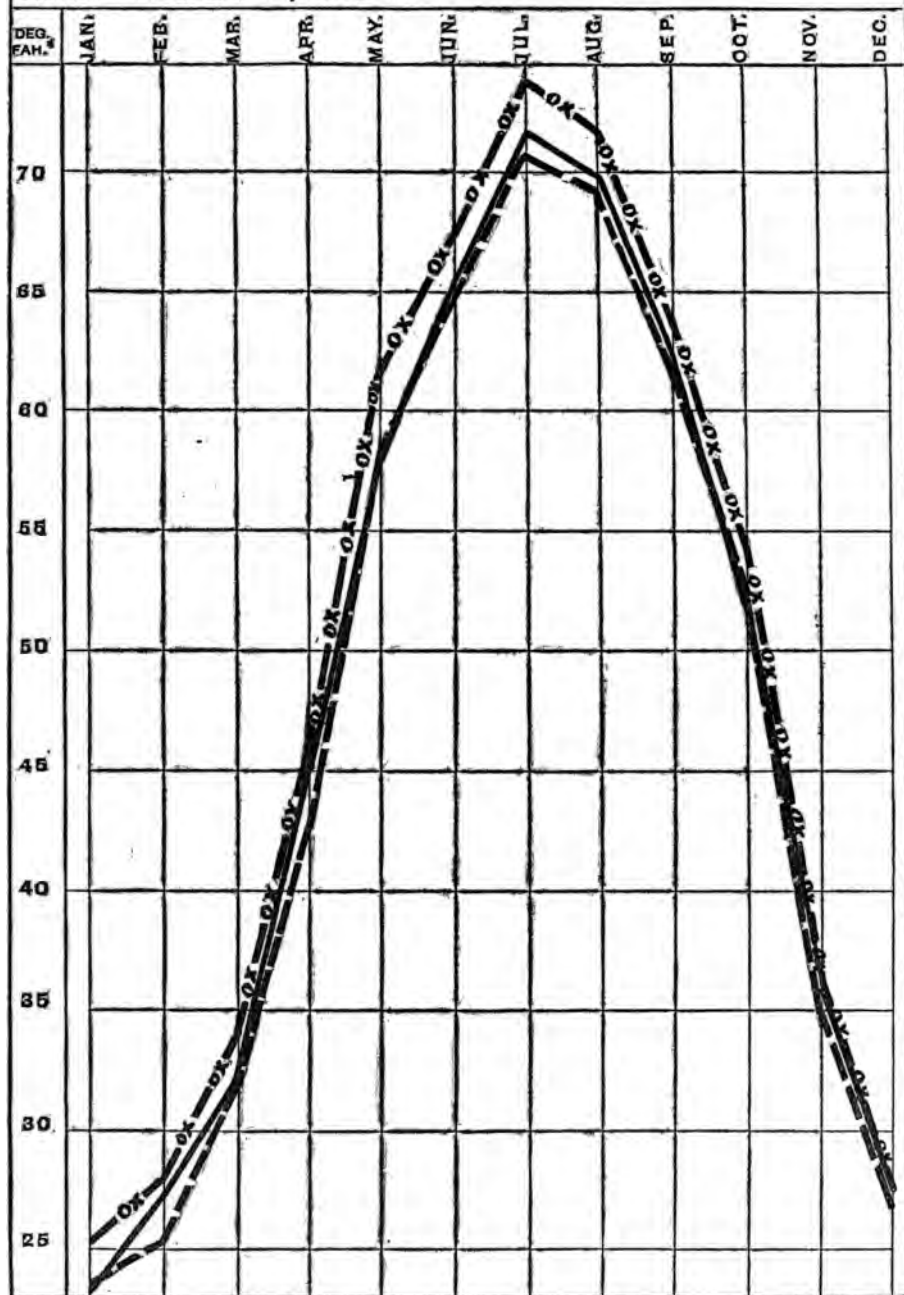
EXHIBIT 16.—*Average Temperature, by Year and Months, for the four Years 1879-82. Observations made at Office State Board of Health, State Capitol, Lansing, Michigan.*

YEARS, ETC.	AVERAGE TEMPERATURE,—DEGREES FAHR.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 4 years...*	49.16	25.31	28.07	34.30	45.77	61.60	67.50	73.88	71.75	63.57	54.35	36.20	27.63
1879.....	48.87	21.78	22.49	36.27	47.54	60.88	67.71	75.86	70.65	58.11	59.50	33.22	27.46
1880.....	48.94	36.81	31.62	34.19	47.46	65.48	69.44	71.69	70.38	61.19	48.64	28.78	21.65
1881.....	49.59	16.98	22.27	30.59	43.23	66.94	65.99	75.41	74.63	71.33	53.63	38.78	35.28
1882.....	49.23	25.65	35.88	36.14	44.83	53.10	66.86	72.57	71.34	63.64	55.63	39.00	26.13
In '82, Higher than Av. '79-82	.07	.34	7.81	1.84	-----	-----	-----	-----	-----	.07	1.28	2.80	-----
In 1882, Lower than Av. '79-82	-----	-----	-----	-----	.94	8.50	.64	1.31	.41	-----	-----	-----	1.50
In '82, Higher than in 1881...	-----	8.67	13.61	5.55	1.60	-----	.87	-----	-----	-----	2.00	.22	-----
In 1882, Lower than in 1881...	.36	-----	-----	-----	-----	13.84	-----	2.84	3.29	7.69	-----	-----	9.15

* The average line for these four years is represented in Diagram No. XVII, page 131.

DIAGRAM XVII. AVERAGE TEMPERATURE, YEARS 1877-1882.

AT LANSING, 1879-82, —OX—OX; AT STATIONS IN MICHIGAN, 6 YEARS, 1877-82, ———; AT STATIONS IN MICHIGAN, 4 YEARS, 1879-82, ———. THE NUMBER OF STATIONS AND THE TEMPERATURE FOR EACH YEAR ARE STATED IN EXHIBIT 17, PAGE 132.



SCALE 10° F. TO 1.24 IN. VERTICALLY.

H. B. T. DEL.

DES. BY H. B. B.

EXHIBIT 17.—Average Temperature, by Year and Months, in 1882, compared with Annual and Monthly Averages for the 6 Years 1877-1882.

YEARS, ETC.	AVERAGE TEMPERATURE.—DEGREES FAHR.												
	Annu- al Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 6 years— 1877-1882.....	47.61	23.42	27.30	32.49	45.14	57.84	65.42	71.73	69.89	62.41	52.07	35.88	27.72
Av. 4 years— 1879-1882.....	46.93	23.54	25.45	31.89	42.97	58.52	64.97	70.84	69.47	61.67	52.38	34.84	26.71
1877 — (12 sta- tions).....	48.67	19.18	32.27	25.92	46.71	58.24	67.48	72.80	70.52	63.80	52.78	37.57	36.73
1878 — (14 sta- tions).....	49.24	27.17	29.75	41.46	52.27	54.73	65.18	74.22	70.92	63.99	50.13	38.34	22.74
1879 — (19 sta- tions).....	46.82	20.86	20.69	33.08	44.29	58.03	64.70	73.16	68.99	57.43	57.43	36.80	26.41
1880 — (15 sta- tions).....	46.55	34.06	27.93	31.00	44.39	62.27	67.41	69.39	68.07	59.54	46.69	27.24	20.67
1881 — (20 sta- tions).....	47.22	14.93	19.75	29.36	40.53	62.72	63.32	72.95	71.76	67.99	51.87	37.42	34.08
1882 — (22 sta- tions).....	47.14	24.32	33.42	34.12	42.65	51.04	64.43	67.84	69.05	61.70	53.53	37.90	25.72
In 1882 High- er than Av. 6 yrs.—1877-82	-----	.90	6.12	1.63	-----	-----	-----	-----	-----	-----	1.46	2.02	-----
In '82 Lower than Av. 6 yrs.—1877-82.	.47	-----	-----	-----	2.49	6.80	.99	3.89	.84	.71	-----	-----	2.00

NOTE.—The stations represented in the lines for average temperature for the years 1877-82, in Exhibit 17, above, are the following: Thornville, Kalamazoo, Mendon, Tecumseh, and Detroit, for each of the 6 years 1877-82; also Battle Creek for the 4 years 1877-80, and for 1882; Nirvana for 1877-79, and for the first 4 months of 1880; Reed City for the last 8 months of 1880, and for 1881 and 1882; Coldwater, Ypsilanti, and Woodmere Cemetery (near Detroit) for 1877-79; Otisville for the 3 years 1878-80, and for 1882; Niles for 1878, 1879, 1881; Marquette, Alpena, Grand Haven, Port Huron, Lansing, and Washington, for 1879-82; Benton Harbor, 1877 and 1878; Agricultural College (near Lansing) for 1877, 1881, 1882; Petoskey for 1878 and 1879; Escanaba for 1880, 1881, and 1882; Harrisville, Ann Arbor, and Parkville, for 1881 and 1882; Traverse City, Hilledale, and Marshall for 1882; Winfield, and Hudson, and Mallory Lake, for 1881. For Detroit for 1877 and 1878, for all stations for 1880, and for the U. S. Signal Service stations for the first 6 months of 1881, the daily means were found by the formula $\frac{1}{4}(7 \text{ A. M.} + 2 \text{ P. M.} + 9 \text{ P. M.} + 9 \text{ P. M. observations})$; for the U. S. Signal Service stations for the last 6 months of 1881, and for 1882, they were found by formula $\frac{1}{4}(7 \text{ A. M.} + 3 \text{ P. M.} + 11 \text{ P. M. observations, Washington time})$; in other cases they were found by formula $\frac{1}{4}(7 \text{ A. M.} + 2 \text{ P. M.} + 9 \text{ P. M. observations})$.

The first two lines in Exhibit 17 are represented in Diagram XVII, page 131; all except the second are represented in Diagram XVI, page 133.

FOOTNOTES TO TABLE I., PAGE 134.—Continued.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 11, page 122.

‡ The names of divisions, and the counties in each are stated in Exhibit 1, page 5.

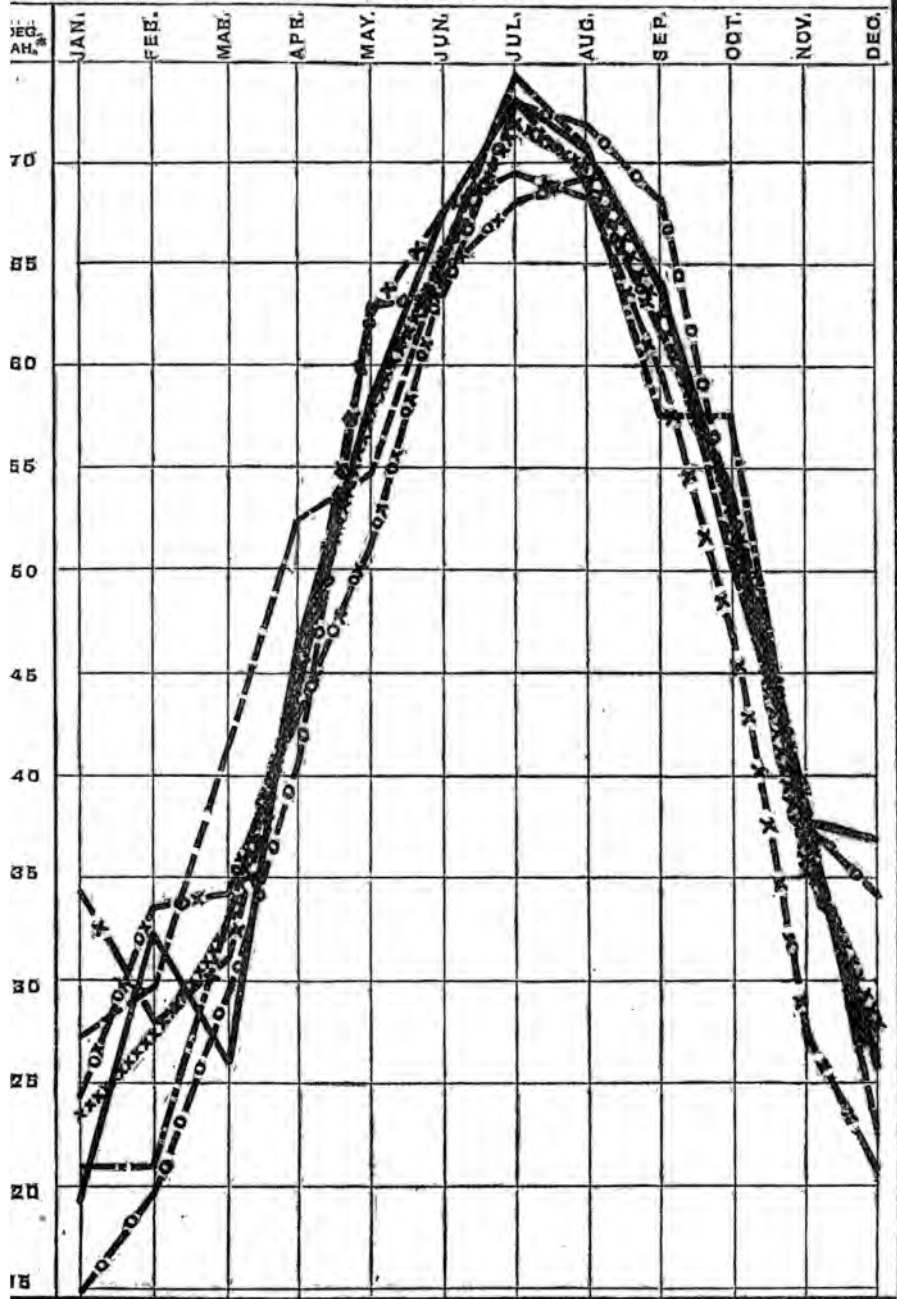
§ This line is an average for only the 22 stations from which statements nearly completed were received for every month of the year. It does not include Hastings or Winfield.

|| Numbers in this column state the average annual temperature for periods of years ending in each case with Dec. 31, 1882. The small figures above and at the right of numbers which state the temperature, denote the number of years included in the average.

¶ The computations of Av. Temp., as tabulated for months in 1882, were made at the following stations: Marquette, Escanaba, Grand Haven, Detroit, and Ann Arbor. At Alpena for March and May, only. At Port Huron the daily average, only, was computed for each month. All other computations in Table I. were made at the office of the State Board of Health.

DIAGRAM XVI.—AVERAGE TEMPERATURE, YEARS 1877-1882.

AT STATIONS IN MICHIGAN: 1877 (12 STATIONS) ————, 1878 (14 STATIONS) ————, 1879 (19 STATIONS) ————, 1880 (15 STATIONS) ————, 1881 (20 STATIONS) ————, 1882 (22 STATIONS) ————, AV. FOR 6 YRS, 1877-82 ALL STATIONS xoxoxoxox.



SCALE 10° F. TO 1.14 IN. VERTICALLY.

W. T. B. L.

DES. BY H. B. B.

TABLE I.—Average Temperature in Degrees Fahr., for the Year, and for each Month of the Year 1882, at each of 24 Stations in Michigan, and also the Average for 22 of the same Stations. From Observations made Daily at 7 A. M., 2 P. M., and 9 P. M.,* by Observers† for the State Board of Health, and for the U. S. Signal Service.

STATIONS IN MICHIGAN.† (Those of the U. S. Signal Service in italics.)	DIVISION OF THE STATE.†	TEMPERATURE, IN DEGREES FAHR.													
		YEAR.		MONTHS,† 1882.											
		Norm. ||	1882.	Jan.	Feb.	Mar.	Apr.	May.	J'ne.	J'ly.	Aug.	Sep.	Oct.	Nov.	Dec.
Av. for 22 stat'ns§	-----	-----	47.14	24.32	33.42	34.12	42.65	51.04	64.43	67.84	69.05	61.70	53.53	37.90	25.72
<i>Marquette</i>	U. P.	42.59 ¹¹	42.28	20.80	28.10	27.60	36.50	46.00	56.50	62.90	62.40	56.90	50.10	35.40	24.10
<i>Escanaba</i>	U. P.	40.97 ¹¹	42.76	18.90	26.80	28.10	36.60	46.60	59.50	64.60	64.60	58.20	50.90	35.40	22.90
Traverse City.....	N. W.	----- ¹⁰	45.13	20.90	29.70	30.33	40.38	49.71	61.24	67.55	67.09	60.03	52.68	36.41	25.51
<i>Alpena</i>	N. E.	41.89 ²	42.68	20.20	28.60	27.30	36.70	44.40	57.77	63.90	65.41	58.10	50.20	35.40	24.20
Harrisville.....	N. E.	44.16 ¹¹	44.62	21.40	29.36	29.69	38.09	46.43	59.79	66.20	67.69	61.16	51.95	37.47	26.18
<i>Grand Haven</i>	W.	47.25 ⁵	48.18	27.90	35.90	35.30	43.60	51.90	62.80	66.40	68.80	62.20	54.70	40.40	28.20
Reed City.....	W.	45.76 ⁸	45.63	20.73	31.20	31.58	42.60	52.03	64.89	67.27	68.39	59.38	50.05	35.49	23.97
<i>Port Huron</i>	B. & E.	45.82 ⁶	45.78	24.30	32.40	32.80	39.70	47.60	61.30	66.50	67.80	61.60	53.10	36.80	25.50
Thornville.....	B. & E.	48.58 ¹⁹	49.02	26.19	34.88	36.02	44.68	53.14	67.52	70.28	70.82	62.60	55.19	39.53	27.33
Agr'l College.....	C.	46.85 ¹⁹	47.57	24.89	35.12	35.96	44.70	52.73	66.49	67.71	69.52	59.98	52.67	36.30	24.80
Hastings.....	C.	----- ³	47.94	23.31	32.71	34.45	44.89	53.07	67.40	68.60	70.39	61.83	54.08	37.81	26.78
Lansing.....	C.	49.25 ³	49.23	25.65	35.88	36.14	44.83	53.10	66.86	72.57	71.34	63.64	55.63	39.00	26.13
Otisville.....	C.	----- ⁹	47.21	23.54	33.26	33.61	42.70	50.52	65.21	68.89	70.10	62.36	53.59	37.14	25.55
Winfield.....	C.	47.98 ²	47.82	24.47 ^f	33.29 ^g	34.97	43.91	53.14	66.98	69.28	70.66	62.06	52.33	37.69	25.10
Ann Arbor.....	S. C.	47.63 ²	47.31	24.00	33.50	35.30	43.10	51.60	65.10 ^b	67.90 ^e	68.90	62.10	53.90 ^a	37.60 ^b	24.70
Battle Creek.....	S. C.	-----	50.20	28.88	37.50	37.68	46.02	54.23	68.31	69.77	71.56	63.69	55.40	40.49	28.91
Hillsdale.....	S. C.	----- ⁶	47.70	24.83	34.08	35.72	43.61	52.06	65.86	67.54	69.73	61.86	54.15	38.23	24.69
Kalamazoo.....	S. C.	48.52 ⁵	48.69	25.25	35.35	36.17	45.24	52.78	67.38	68.54	71.19	63.81	54.49	38.66	25.39
Marshall.....	S. C.	----- ⁶	49.58	26.18	35.44	37.23	46.58	54.48	68.13	69.75	71.83	63.67	55.11	39.58	27.00
Mendon.....	S. C.	48.29 ²	48.91	26.08 ^b	36.51 ^d	37.10	45.68	53.50	67.11 ^e	68.01	70.61 ^c	63.52 ^d	54.45 ^a	38.81	25.57
Parkville.....	S. C.	48.53 ⁶	48.57	25.18	34.90	36.20	44.99	53.75	67.68	68.37	71.24	63.29	55.16	37.97	24.13
Tecumseh.....	S. C.	48.16 ¹¹	48.06	24.48	34.24	36.45	43.80	52.23	66.31	69.01	70.47	63.07	53.74 ^a	37.94	24.99
<i>Detroit</i>	S. E.	48.33 ⁴	51.20	31.00	39.90	39.80	45.90	53.20	67.20 ^b	70.10	71.30	64.20	57.80	43.00	31.00
Washington.....	S. E.	46.63 ⁴	46.85	23.80	32.52	34.58	42.30	50.98	64.40	68.66	68.40	62.11	52.60	36.80	25.08

a, b, c In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly under the numbers from which they refer to the notes below.

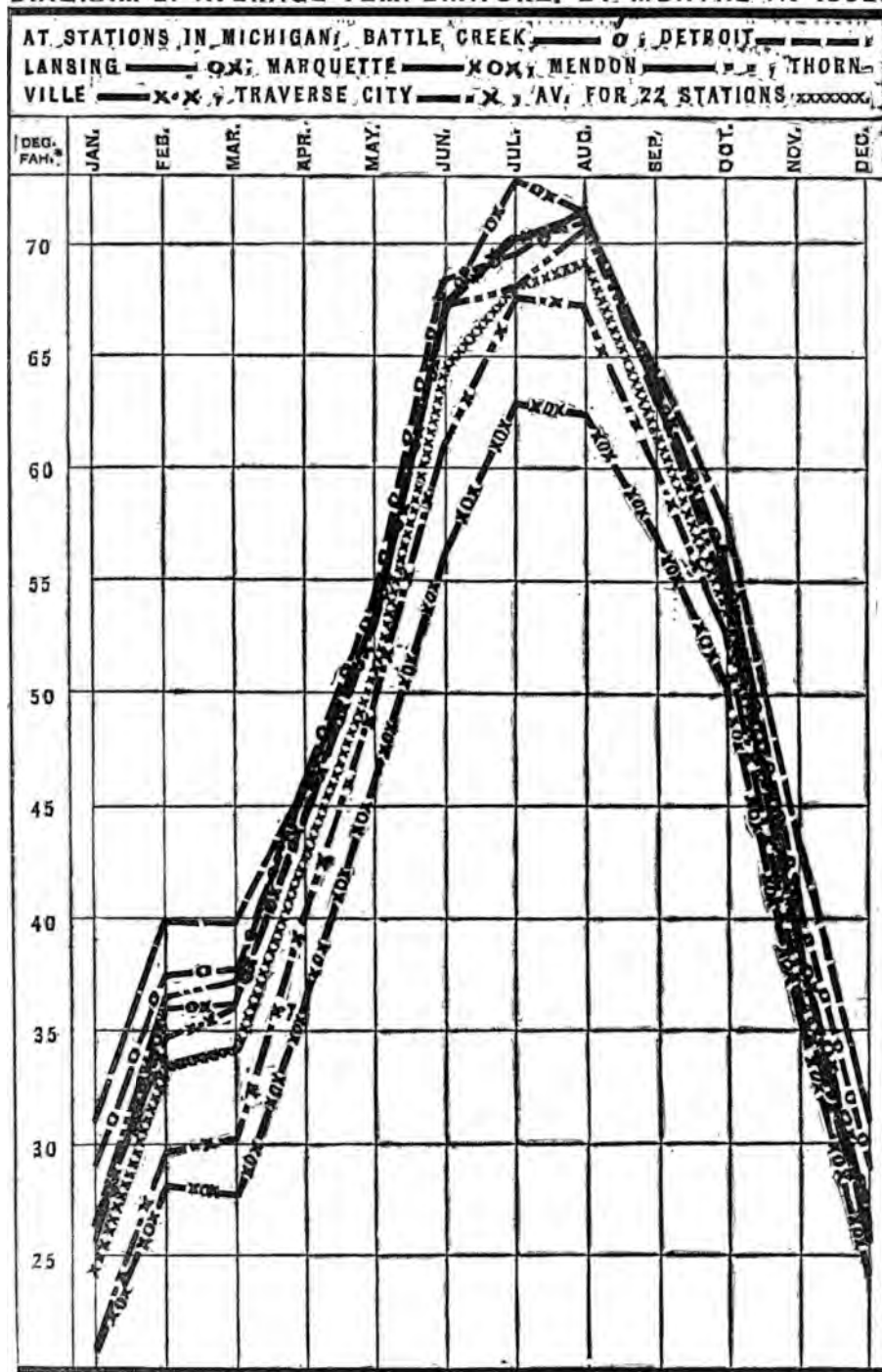
a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days. h For 23 days. i For 22 days. j For 21 days.

* At the U. S. Signal Service Stations for the year 1882, the observations were made at 7 A. M., 3 P. M., and 11 P. M., Washington mean time, and one-third the sum of the three observations was taken as the daily average. The local time at these stations corresponding to 7 A. M., 3 P. M., and 11 P. M., Washington time, is as follows: At Port Huron, 6:38 A. M., 2:38 P. M., and 10:38 P. M.; at Detroit 6:36 A. M., 2:36 P. M., and 10:36 P. M.; at Alpena, 6:34 A. M., 2:34 P. M., and 10:34 P. M.; at Grand Haven, 6:23 A. M., 2:23 P. M., and 10:23 P. M.; at Escanaba, 6:20 A. M., 2:20 P. M., and 10:20 P. M.; at Marquette, 6:19 A. M., 2:19 P. M., and 10:19 P. M. At the other stations the observations were made at 7 A. M., 2 P. M., and 9 P. M., local time; and the daily averages were one-third the sum of these three observations.

[Footnotes to Table I. are continued on page 132.]

The lines for 7 representative stations in Table I. are graphically represented in Diagram I., page 135. Comments on the diagrams are printed on a following page.

DIAGRAM I—AVERAGE TEMPERATURE, BY MONTHS IN 1882.



* SCALE, 10° F. TO 1/2 IN VERTICALLY. H. B. T. DEL. DEN. BY H. B. T.

EXHIBIT 18.—Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each month of the Year 1882, with the Average of the Extremes, and of the Range, for the Nine Years 1873-81; also, Statement of the Extremes and of the Range for each of the Nine Years, 1873-81. Observations made with Registering Thermometers (except for the first two months of 1873, and for those two months with an ordinary Thermometer, at 7 A. M., 2 P. M., and 9 P. M.) Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.

YEAR AND MONTHS.	EXTREMES AND RANGES OF TEMPERATURE,—DEGREES F.																																			
	1873.		1874.		1875.		1876.		1877.		1878.		1879.		1880.		1881.		Average for 9 years, 1873-81.*			1882.		1889 HOFER (+), OR LOWER (-), THIS AV. 9 YRS. 1873-81.												
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Range.									
Year	94	-30	124	101	-7	108	94	-33	127	96	-19	115	93	-14	107	98	-7	105	97	-18	115	94	-17	111	100	-17	117	96	-18	114	89	-10	99	-7	+8	-15
Av. Mo....	74	15	59	77	15	62	75	10	64	74	19	56	74	20	54	73	22	51	76	15	61	74	20	54	73	22	52	74	18	57	72	23	49	-2	+5	-8
Jan.....	43	-30	73	59	-7	66	35	-13	48	65	6	59	52	-9	61	48	-4	52	44	-18	62	62	9	53	37	-9	46	49	-8	58	50	-2	52	+1	+6	-6
Feb.....	49	-13	62	48	-1	49	42	-33	75	59	-1	60	56	10	46	55	-7	62	41	-6	47	59	-2	61	48	-17	65	51	-8	59	57	12	45	+6	+20	-14
Mar.....	57	-12	69	67	8	59	75	-11	86	60	0	60	51	-14	65	73	18	54	66	4	62	55	6	49	50	9	41	61	1	61	66	16	50	+5	+15	-11
Apr.....	82	24	68	68	3	65	80	0	80	74	16	58	81	18	63	75	29	46	81	12	69	76	20	56	83	9	74	78	15	63	73	21	52	-5	+6	-11
May	84	27	57	96	21	75	89	24	65	86	31	58	90	26	64	77	29	48	91	25	66	87	40	47	89	33	56	88	28	60	79	28	51	-9	=	-9
June.....	94	42	52	95	34	61	89	33	56	95	42	53	89	40	49	94	39	55	95	33	62	92	41	51	86	40	46	92	38	54	87	44	43	-5	+6	-11
July.....	92	44	48	98	43	55	92	44	48	96	46	50	91	43	48	98	47	51	97	47	50	94	50	44	95	52	43	95	46	49	89	47	42	-6	+1	-7
Aug.....	94	44	50	101	41	60	93	35	58	96	38	60	93	43	50	93	42	51	96	34	62	88	43	45	100	46	54	95	40	54	89	49	40	-6	+9	-14
Sept.....	89	26	63	95	30	65	94	26	68	80	36	44	85	38	47	92	31	61	85	27	58	88	30	58	97	43	54	89	32	58	85	32	53	-4	=	-5
Oct.....	79	16	63	76	16	60	77	18	59	75	19	56	87	26	61	89	21	61	87	15	72	76	24	52	75	50	45	79	21	59	77	24	53	-2	+3	-6
Nov.....	56	1	55	70	3	67	60	2	58	62	12	50	55	4	51	59	15	37	75	13	62	62	-4	66	64	12	52	62	6	55	70	14	56	+8	+8	+1
Dec.....	64	10	54	50	-6	56	70	-1	71	41	-19	60	58	13	45	36	-2	38	58	-3	61	47	-17	64	56	12	44	53	-1	55	40	-10	50	-9	-9	-5

* For the nine years 1873-81, the highest temperature was 101°, August 11, 1874; the lowest was -33°, February 8, 1876, and the range was 134°, F.

The average temperature at each of 24 stations in Michigan, and the average for 22 of these stations, in 1882 and in each month of that year, are stated in Table I., page 134. Seven of the lines in this table are represented in Diagram I., page 135.

A comparison, by months, of temperature in 1882 with the averages for corresponding months in the preceding 18 years (1864-81), at the Agricultural College, near Lansing, is given in Exhibit 15, page 130.

The average temperature by months in each of the four years 1879-82, at Lansing, and a comparison of 1882, by months, with that average, are stated in Exhibit 16, page 130. In Diagram XVII., page 131, the average for four years at Lansing is compared by months with the average for the same period at all stations in the State. For every month of this period of four years the temperature observed at Lansing was higher than the average for all stations in the State, as may be seen by comparing Exhibits 16 and 17. This may, in part, be due to the influence of the capitol building, near which the thermometer in use at Lansing is placed.

The average annual and monthly temperature at from 12 to 32 stations per year for each of the six years 1877-82, and for the entire period, is stated in Exhibit 17, page 132, in which is also given, by months, a comparison of 1882 with the average for the period. The several lines in Exhibit 17 are represented, drawn to scale, in Diagram XVI., page 133.

The highest and the lowest temperature at the Agricultural College in every month of the 10 years 1873-82, and comparisons of months in 1882 with the average highest and lowest temperatures, by months for the preceding nine years, are stated in Exhibit 18, page 136.

The average daily range of temperature at from 6 to 17 stations per year by months in each of the four years 1879-82, and a comparison of 1882 with monthly averages for the period, are given in Exhibit 19, page 138. The first five lines of this exhibit are represented in Diagram XVIII., page 139.

The highest and the lowest temperatures in every month in 1882, at each of 23 stations, are stated in Table II., pages 140-1.

The average daily range of temperature by months in 1882, at each of 17 stations, and the average for the 17 stations, are stated in Table III., page 142. The lines for 10 of these stations are represented in Diagram II., page 143. It will be noticed that the greatest average daily range occurs during the warm months.

EXHIBIT 19.—*Average Daily Range of Temperature, by Year and Months in 1882, compared with Annual and Monthly Averages for the 4 Years, 1879-82.**

YEARS, ETC.	AVERAGE DAILY RANGE OF TEMPERATURE—DEGREES FAHR.												
	Ann. Av.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 4 years, 1879-82.....	17.71	16.17	17.33	16.17	19.52	21.34	19.80	19.77	19.15	18.46	17.74	14.55	12.58
1879 (6 stations*)..	19.22	17.12	17.64	16.95	21.43	23.58	21.87	20.92	22.21	19.06	18.61	16.00	15.23
1880 (12 stations*)	17.03	15.55	17.47	17.46	18.15	20.86	18.61	18.50	17.97	17.69	16.37	14.52	11.26
1881 (10 stations*)	17.17	16.30	17.68	14.37	19.43	21.38	18.37	19.40	19.62	17.76	16.22	14.17	11.41
1882 (17 stations*)	17.43	15.70	16.52	15.89	19.08	19.55	20.33	20.25	16.80	19.31	19.77	13.51	12.43
In '82 Greater than Av. 1879-82	-----	-----	-----	-----	-----	-----	.53	.48	-----	.85	2.03	-----	-----
In '82 Less than Av. 1879-82.....	.18	.47	.81	.28	.44	1.79	-----	-----	2.35	-----	-----	1.04	.15

* Marquette, Grand Haven, Lansing, and Detroit for each of the four years 1879-82; also Otisville for 1879, 1880, and 1882; Battle Creek for 1879 and 1880; Escanaba, Alpena, Port Huron, Thornville, and Kalamazoo for 1880-82; Adrian for 1880, and Agricultural College for 1881 and 1882; Traverse City, Harrisville, Reed City, Ann Arbor, Marshall, and Washington for 1882.

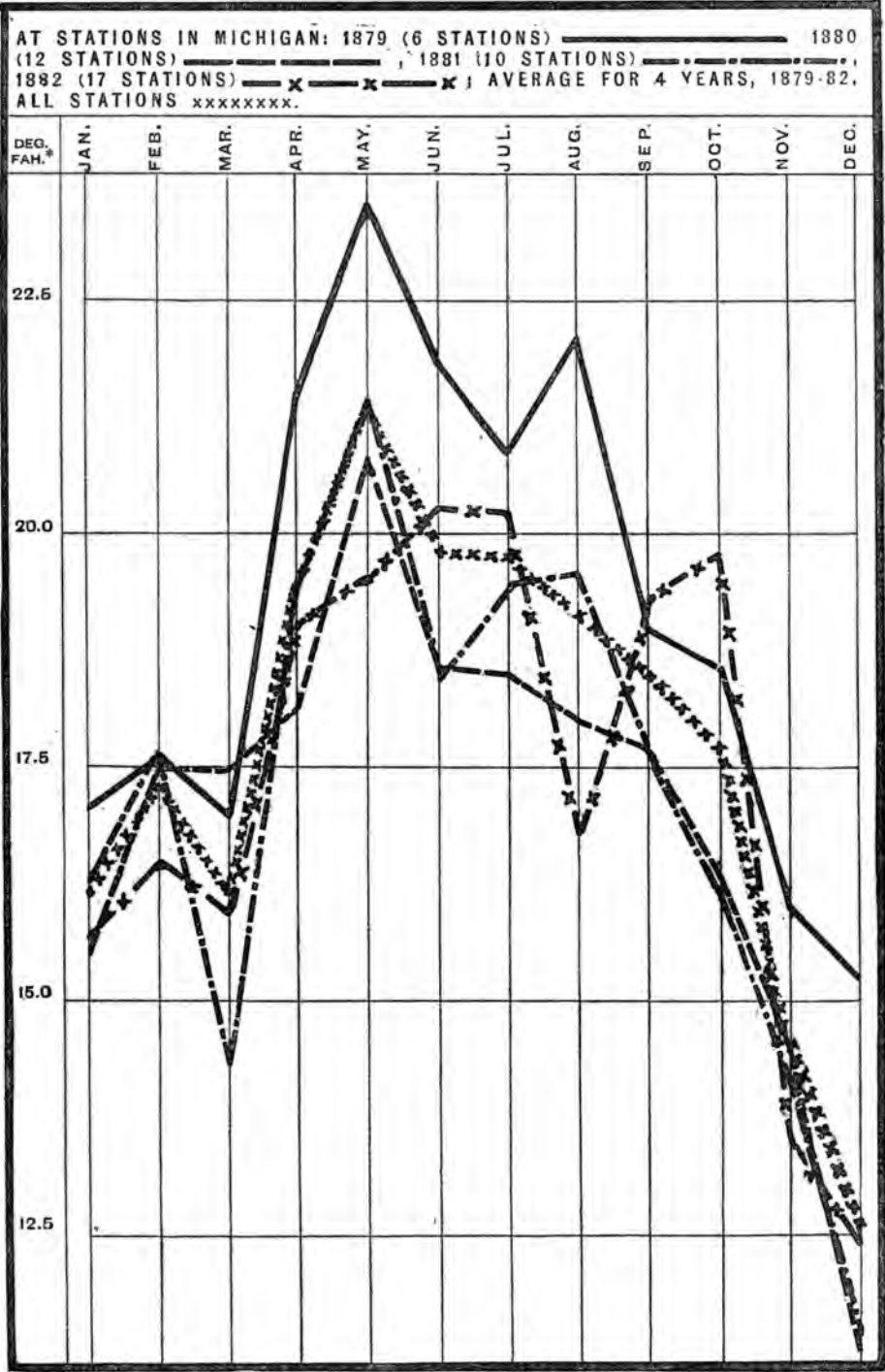
Graphic representations of statements in Exhibit 19 are given in Diagram XVIII., page 139.

EXHIBIT 20.—*Comparisons of the Average Daily Range of Temperature for the Year and for each Month of the Year 1882, with Averages for the 8 Years 1874-81, and for the Year 1881; Observations made with Registering Thermometers by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

YEARS, ETC.	AVERAGE DAILY RANGE OF TEMPERATURE.—DEGREES FAHR.												
	Annua l Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 8 yrs, '74-81*	21.60	16.83	19.35	19.15	23.61	26.36	24.31	26.23	27.26	24.74	20.48	16.04	14.92
1881.....	20.52	18.65	20.18	16.16	23.13	25.35	20.80	23.55	25.06	22.73	20.61	16.57	13.45
1882.....	19.39	16.80	18.93	18.16	20.27	21.35	20.20	20.87	19.54	22.70	24.23	16.17	13.45
In 1882 Great- er than Av. for 1874-81....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.75	.13	-----
In 1882 Less than Av. for 1874-81.....	2.21	.03	.42	.99	3.34	5.01	4.11	5.36	7.72	2.04	-----	-----	1.47
In 1882 Great- er than in '81	-----	-----	-----	2.00	-----	-----	-----	-----	-----	-----	3.62	-----	0
In 1882 Less than in '81....	1.13	1.85	1.25	-----	2.86	4.00	.60	2.68	5.52	.03	-----	.40	0

* For the years 1874-6, 1878, 1879 (except Nov. and Dec.), and 1880, the computations were made from the report of observations published in the Reports of the State Board of Agriculture for those years. For 1877, 1881 (except Jan.), and 1882, the computations were made from registers, or copies of registers supplied by Dr. Kedzie.

DIAGRAM XVIII.—AV. DAILY RANGE OF TEMP., BY MOS. 1879-82.



* SCALE 10° F RANGE TO 5 IN. VERTICALLY.

H. B. T. DEL.

DES. BY H. B. H.

TABLE II.—*Extremes of Temperature and Days of Month on which the Highest and for the Year 1882, at each of 23 Stations in Michigan,—as indicated by Daily Readings P. M., by Observers* for the State Board of Health, and for the U. S. Signal Service.*

Line Number.	STATIONS IN MICHIGAN.* (Those of the U. S. Signal Service in Italics.)	YEAR 1882.†			JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.	
		Highest.	Lowest.	Range.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1	At 23 Stations.‡	93	-27	120	56	-27	59	1	67	-4	79	11	83	11
2	Marquette.....¶	86	-10	96	40 ⁸	-10 ²³	52 ¹¹	7 ¹⁷	51 ²	1 ⁸	66 ¹⁷	17 ¹⁰	75 ^{18,20}	23 ²
3	Escanaba.....¶	86	-12	98	42 ¹¹	-10 ²³	43 ⁹	2 ⁶	52 ²	6 ²⁴	58 ⁴	18 ¹⁰	61 ^{17,18,20,30}	20 ²
4	Traverse City§	90	-25	115	39 ²⁵	-25 ²³	57 ¹²	4 ⁴	54 ³	9 ²⁵	72 ³	20 ¹¹	82 ³⁰	26 ¹
5	Alpena.....¶	89	-27	116	38 ^{9,36}	-27 ²³	54 ^{12,13}	2 ¹⁷	55 ¹	0 ²⁵	60 ¹⁰	12 ¹⁰	68 ³⁰	25 ²
6	Harrisville.....§	92	-19	111	42 ^{9,36}	-19 ²³	55 ¹⁵	2 ³	54 ¹	24 ¹⁹	70 ^{9,10}	11 ¹¹	77 ³¹	23 ^{1,4}
7	Grand Haven¶	83	-1	84	49 ²⁶	3 ²⁴	57 ¹²	17 ¹⁸	52 ¹	19 ¹³	71 ¹¹	22 ¹⁴	76 ³⁰	29 ¹
8	Reed City.....§	93	-16	109	43 ⁸	-16 ²⁴	57 ¹²	5 ²³	57 ²¹	-4 ⁸	70 ¹⁰	12 ^{10,11}	81 ³⁰	11 ²
9	Port Huron.....¶	91	-7	98	51 ²⁶	-7 ²⁴	55 ¹²	11 ²⁵	58 ²	15 ^{8,25}	69 ⁴	19 ¹¹	71 ³⁰	26 ²
10	Thornville.....§	91	-8	99	53 ⁸	-8 ²³	57 ¹²	14 ¹³	60 ³	19 ⁷	71 ¹⁰	22 ¹⁰	75 ³⁰	26 ¹
11	Agr'l College.‡	89	-10	99	50 ²⁷	-2 ²⁴	57 ¹²	12 ¹³	66 ³	16 ²⁵	73 ⁴	21 ¹¹	79 ³¹	28 ²
12	Hastings.....¶	91	-10	101	54 ²⁶	-2 ²³	57 ¹²	12 ¹³	63 ^{1,2}	14 ⁴	73 ¹⁰	12 ¹⁰	88 ³⁰	20 ¹
13	Lansing.....§	90	-4	94	53 ⁸	-4 ²⁴	59 ¹²	15 ¹	63 ⁸	17 ⁸	75 ¹¹	19 ¹¹	78 ^{30,31}	27 ²
14	Otisville.....¶	93	-10	103	52 ⁹	-8 ²⁴	57 ¹²	9 ⁹	60 ³	10 ²⁴	70 ⁴	17 ¹⁰	76 ³⁰	23 ²
15	Winfield.....§	---	---	---	---	---	55 ^{12,15,16}	7 ²³	62 ³	12 ²⁵	73 ⁴	15 ¹¹	80 ³⁰	21 ²
16	Ann Arbor.....§	88	-7	95	53 ²⁶	-4 ²³	56 ¹²	13 ¹³	61 ^{1,2}	17 ²⁴	73 ⁴	17 ¹⁰	74 ³⁰	27 ^{1,3}
17	Battle Creek...§	87	-5	92	54 ²⁶	-2 ²³	58 ^{12,16}	14 ²²	62 ²⁹	18 ²⁴	72 ⁴	20 ¹⁰	77 ³⁰	29 ¹
18	Hillsdale.....§	88	-8	96	54 ⁸	1 ²³	56 ^{12,15,28}	13 ¹⁶	62 ²	17 ²⁴	76 ³	17 ¹¹	78 ³⁰	26 ¹
19	Kalamazoo.....§	91	-4	95	51 ²⁶	1 ²³	58 ^{12,15,28}	15 ²²	63 ²	19 ²⁴	75 ⁴	21 ¹⁰	80 ³⁰	27 ¹
20	Marshall.....§	91	-4	95	52 ²⁶	0 ²³	55 ^{12,15,28}	9 ²²	62 ²	18 ²⁴	73 ⁴	20 ¹⁰	80 ³⁰	28 ^{1,3}
21	Mendon.....§	93	-7	100	53 ⁸	2 ²⁴	59 ¹²	14 ¹⁵	67 ³	18 ²⁴	79 ⁴	20 ¹¹	80 ³⁰	27 ²
22	Parkville.....**	90	-10	100	50 ⁸	5 ²³	57 ¹²	15 ¹³	61 ²	20 ²⁴	73 ⁴	23 ¹⁰	80 ³⁰	33 ²
23	Tecumseh.....§	93	-11	104	53 ²⁶	-2 ²⁴	55 ¹²	12 ¹³	64 ²⁶	15 ²⁴	78 ⁴	18 ¹¹	76 ³⁰	26 ²
24	Detroit.....¶	89	2	87	56 ²¹	8 ²⁴	58 ¹²	2 ^{23,25}	64 ³⁰	23 ⁸	71 ⁵	24 ¹¹	71 ^{27,31}	33 ²
25	Washington...¶	89	-5	94	51 ⁸	-5 ²⁴	58 ¹²	13 ¹³	62 ³⁰	16 ⁸	73 ⁵	19 ¹¹	72 ^{27,31}	24 ²

NOTE.—The small figures above and at the right of numbers denoting the degrees of temperature state the day or days of the month on which the highest or the lowest temperature occurred.

* The names of observers, etc., are stated in Exhibit 11, page 122.

‡ The line No. 1, and the three columns for the year 1882, relate only to the 23 stations from which observations were received for every month of the year.

§ Determined by daily readings of registering thermometers made and recorded at 7 A. M., for the preceding calendar day. But at Hastings, Otisville, and Washington the observations were recorded for the calendar day on which they were made; and at the stations of the U. S. Signal Service the registering thermometers were recorded and set each day at 11 P. M., Washington time; and at Parkville the extremes were determined from the 7 A. M., 2 P. M., and 9 P. M. observations with the dry bulb of psychrometer.

the Lowest Temperature occurred, by Months of the Year 1882; also Extremes and Range of Registering Thermometers, or by Observations made Daily at 7 A. M., 2 P. M., and 9

JUNE.		JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.		Line Number.
Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	
83	25	93	39	92	41	90	27	86	21	74	8	50	-15	1
16	2, 3, 11	28	1	29	18	5	25, 26	7	11, 19	7	25	25	8	
80	38	86	45	85	42	81	36	75	33	53	19	39	-8	2
7	1	27	30	4	13	6	22	6, 7	19	11	25	30	8	
86	37	84	48	83	43	76	37	68	30	59	14	41	-12	3
14	4	25	1	21, 22	12	18	26	6	23, 27	11	24	21, 21	18	
86	38	90	49	83	46	86	36	80	31	64	19	36	4	4
7	2	28	3	15	13, 19	18	24, 26	7	24	11	29, 30	21, 22	8	
85	39	89	45	85	45	88	36	78	29	62	16	36	-2	5
7	8, 9, 11	25, 26	3, 12	7, 15	12, 18	18	23	7	23	11	29	21, 22	7	
84	36	92	45	85	41	88	32	76	24	65	12	38	-4	6
22	4, 6	25	2	22	10	18	24	8	24	11	29	12	18	
83	43	81	50	81	51	78	40	75	34	65	26	44	-1	7
23	5	26	1, 12, 19	6	16	18	23	4, 6, 8	24	11	24	1	17	
93	34	92	39	90	45	85	27	78	21	67	8	41	-15	8
15	12	27	2, 30	6	11	18	22, 24	6	30	11	30	21	8	
88	41	91	50	88	49	83	46	80	34	68	10	41	-2	9
24	1	27	4, 5, 15	6, 15	18, 19	13	25, 26	6	24	11	30	21	18	
88	44	91	50	86	51	85	39	80	29	70	14	43	-6	10
25	10, 18	27	14	24	17	18	23	5, 6	23	11	17	21, 22	17	
87	44	89	47	87	49	85	32	77	24	70	14	40	-10	11
22	1	27, 28	15, 22	16	11	19	24	7	24	11	30	13	18	
91	25	90	42	87	44	87	30	83	22	72	13	42	-10	12
23	4	26, 27	1	15, 22	10	18	23	6	23, 24	11	29	4, 20, 21	18	
89	43	90	41	87	50	90	38	81	30	70	20	40	-4	13
26	6	27, 28	4, 20	7, 21, 26	11	19	24	7	24	12	18, 20	22	18	
90	37	93	45	89	45	89	33	86	23	70	16	40	-10	14
22	5	27	1	22	10	17, 18	23	5, 6	19, 23	11	19	4	17, 18	
93	36	93	41	90	42	89	30	82	22	73	10	41	-10	15
24	1, 2	27	2	7, 5, 15	11	18	24	6, 7	20	11	30	21	8	
87	41	88	40	83	47	84	40	77	30	69	15	41	-7	16
16, 22, 24	5	27	20	15	10	18, 19	23	7	21	11	30	6, 22	8	
85	44	87	48	84	47	86	35	79	24	78	16	46	-5	17
24	3, 5	26, 27	3	15	10	18	23	5, 6	19, 20, 23	11	29	1, 2, 4, 11	7	
88	41	87	46	86	47	84	36	78	30	71	14	42	-8	18
23	3	27	12, 13, 14	20, 22	9, 10	18	25	6	19	11	29	12	7	
90	42	91	50	85	51	88	41	82	34	71	19	41	-4	19
22, 23	5	27	1, 19, 20	5	10	18	23	5	23	11	29	21	7	
89	41	91	48	88	47	87	35	80	28	71	18	40	-4	20
22	3	26	20	22	10	18	23	5	19, 23	11	29	21	7, 8	
93	42	91	48	92	49	90	34	84	30	74	14	44	-7	21
22	3	26	1	25	9, 10	18	25	6	30	11	30, 35	19	8	
90	45	87	55	88	53	88	45	82	31	72	20	41	-10	22
24	6	27	14, 19	21	10	17	11	6	19	11	29	21	7	
91	37	93	46	89	44	89	40	82	25	73	11	42	-11	23
24	1	25	1, 3, 4	12, 15, 21	11	18	25	7	24	11	30	21	8	
86	46	88	53	86	50	89	42	77	37	69	20	50	2	24
25	20	28	15	7, 16	11, 19	19	25	6	20	19	30	22	17, 18	
88	41	89	48	86	47	84	42	80	28	70	15	41	-2	25

|| At Hastings, Otisville, and Washington the observations with registering thermometers were read and recorded at 7 A. M. for the calendar day on which read.

† At the stations of the U. S. Signal Service the observations with registering thermometers were read and recorded at 11 P. M.

** The extremes for Parkville were determined from readings of the dry bulb of the psychrometer at 7 A. M., 2 P. M., and 9 P. M.

a Also on the 12th.

b Also on the 24th, 25th, and 26th.

c Also on the 23d, 24th, and 27th.

d Also on the 25th, 26th, and 27th.

e Also on the 24th, 25th, and 26th.

f Also on the 22d.

TABLE III.—Average Daily Range of Temperature, by Registering Thermometers, during the year and during each Month of the Year 1882, at each of 17 Stations in Michigan, and average for the 17 Stations.

STATIONS IN		Divisions of the State.†	Norm. §	AVERAGE DAILY RANGE OF TEMPERATURE.—DEGREES FAHR.												
MICHIGAN.*				Yr., 1882.	MONTHS, 1882.											
(Those of the U. S. Signal Service in italics.)					Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 17 stations.‡		-----	-----	17.43	15.70	16.52	15.89	19.08	19.55	20.33	20.25	16.80	19.31	19.77	13.51	12.43
<i>Marquette</i>		U. P.	16.79 ⁴	14.30	15.68	15.21	14.45	15.00	15.45	17.20	15.48	12.71	14.63	14.23	10.57	10.94
<i>Escanaba</i>		U. P.	15.85 ³	14.62	14.74	13.27	14.29	15.60	17.04	18.68	16.47	13.81	16.26	14.52	8.50	12.24
Traverse City..		N. W.	-----	16.93	17.84	18.71	18.29	19.03	19.42	19.60	16.87	14.35	19.00	18.55	11.87	9.61
<i>Alpena</i>		N. E.	15.99 ³	15.22	15.24	15.25	15.48	17.35	16.87	17.23	18.81	13.68	15.28	16.16	10.77	10.55
Harrisville.....		N. E.	-----	20.07	18.35	18.89	16.73	21.13	22.13	23.13	24.58	18.58	20.90	21.97	17.37	17.03
<i>Grand Haven</i> ...		W.	13.26 ⁴	12.03	10.90	11.29	9.55	14.57	13.68	14.02	12.02	10.97	12.95	13.84	10.43	10.08
Reed City.....		W.	-----	24.09	23.48	21.04	22.90	25.30	27.65	30.27	28.65	24.48	27.20	25.68	17.93	14.55
<i>Port Huron</i>		B. & E.	15.75 ³	14.90	14.28	14.92	14.07	16.33	15.56	17.13	17.23	13.69	14.74	17.51	11.98	11.41
Thornville.....		B. & E.	16.96 ³	15.74	11.90	14.00	12.65	16.77	18.42	19.47	19.74	15.94	19.23	18.55	12.13	10.03
Agr'l College, near Lansing.		C.	-----	19.39	16.80	18.93	18.16	20.27	21.35	20.20	20.87	19.54	22.70	24.23	16.17	13.45
Hastings.....		C.	-----	21.71	18.65	22.86	19.10	20.03	24.48	23.60	26.52	19.06	25.27	26.58	19.21	15.10
Lansing.....		C.	19.50 ⁴	18.73	17.71	17.43	17.45	20.37	21.29	20.17	20.94	18.68	21.97	21.90	14.37	12.42
Otisville.....		C.	-----	22.36	17.16	21.14	19.45	23.70	24.81	26.80	27.55	22.32	26.03	26.35	18.00	15.03
Winfield.....		C.	-----	19.86	19.38	19.40	23.17	26.55	27.10	29.16	23.87	27.30	27.23	17.87	18.13	
Ann Arbor.....		S. C.	-----	17.92	16.48	16.91	15.94	19.73	20.07	21.11	20.29	17.19	19.04	19.72	14.33	14.18
Battle Creek....		S. C.	-----	19.09	19.32	18.82	17.48	19.70	19.35	18.07	19.61	16.52	17.47	23.87	17.55	21.35
Hillsdale.....		S. C.	-----	19.10	14.90	17.92	16.24	20.87	21.35	20.83	22.77	19.60	21.86	21.47	15.50	15.93
Kalamazoo.....		S. C.	18.60 ³	18.02	15.03	16.13	15.16	20.62	22.02	20.38	21.45	16.71	19.78	20.77	14.35	13.82
Marshall.....		S. C.	-----	18.57	13.97	16.21	15.84	20.60	21.61	22.10	23.84	20.29	22.73	21.97	12.37	11.35
Mendon.....		S. C.	-----	20.36	14.58	17.50	16.59	26.03	23.00	23.33	23.90	20.68	24.83	22.97	15.67	15.23
<i>Detroit</i>		S. E.	15.34 ⁴	14.35	11.50	12.65	12.67	16.34	14.79	16.96	17.82	14.85	15.67	15.90	12.24	10.83
Washington.....		S. E.	-----	19.08	15.87	18.89	17.03	21.73	20.26	21.23	21.65	17.87	20.13	24.16	16.37	13.81

NOTE.—Graphic representations of statements in Table III, are given in Diagram No. II, page 143.

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 11, page 122.

† For counties in each division see Exhibit 1, page 5.

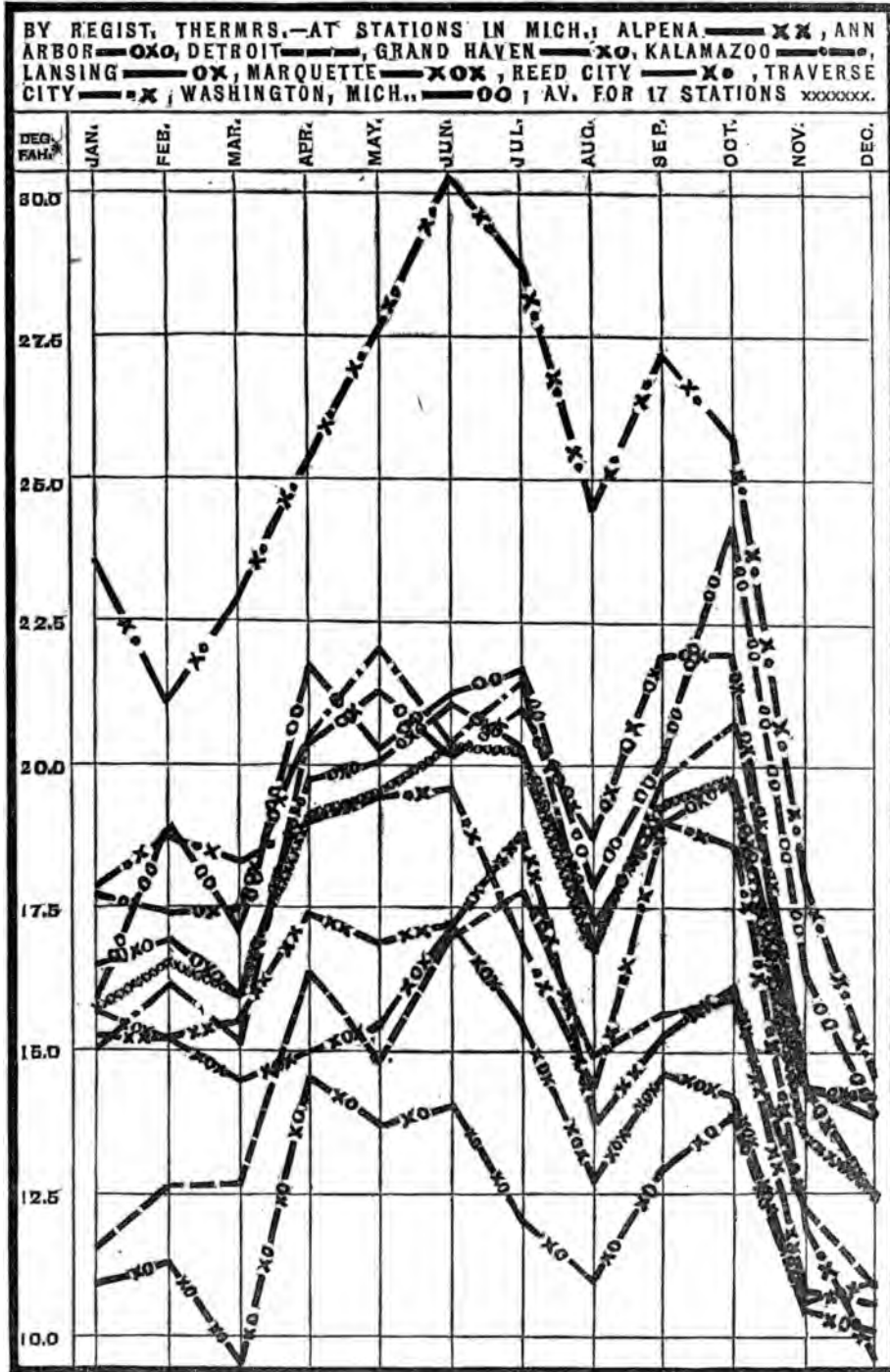
‡ This line is an average for only the 17 stations from which statements, nearly complete, were received for every month of the year. It does not include Hastings, Winfield, Battle Creek, Hillsdale, and Mendon.

§ Numbers in this column state the annual average range of temperature for periods of years ending in each case with Dec. 31, 1882. The small figures above and at the right of numbers which state the range of temperature, denote the number of years included in the average.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly under the numbers from which they refer to the notes below.

• For 24 days. d For 27 days. e For 28 days. f For 29 days. g For 30 days.

DIAGRAM II.—AV. DAILY RANGE OF TEMP., BY MOS., 1882.



*SCALE. 5° F. RANGE TO 1.5 IN. VERTICALLY. H. E. T. D. L. DES. BY H. E. T. D. L.

ABSOLUTE HUMIDITY.

The quantity of invisible vapor of water in the air varies with the temperature, the warmer the out-door air, as a rule, the greater the amount of water it contains. Exhibit 21, below, states for from 9 to 23 stations per year for each of the 6 years 1877-82, and for the entire period, the average monthly humidity of the air. The several lines in Exhibit 21 are represented drawn to scale, in Diagram XIX., opposite this page. The absolute humidity at each of 23 stations, by months in 1882, is stated in Table IV., page 146. Ten lines of Table IV. are graphically represented in Diagram III., page 147.

EXHIBIT 21.—Average Absolute Humidity, by Year and Months, in 1882, compared with Annual and Monthly Averages for the five Years, 1877-1882.*

YEARS, ETC.	ABSOLUTE HUMIDITY—GRAINS OF VAPOR IN A CUBIC FOOT OF AIR.												
	Annua l Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 6 yrs. '77-82	3.57	1.52	1.67	1.97	2.81	4.07	5.30	6.27	6.10	5.12	3.90	2.32	1.81
1877 (9 stat'ns*)	3.71	1.37	1.87	1.61	2.83	4.10	5.67	6.33	6.24	5.37	4.08	2.46	2.61
1878 (12 stat'ns*)	3.81	1.73	1.83	2.79	3.68	3.88	5.26	7.14	6.37	5.44	3.62	2.47	1.54
1879 (16 stat'ns*)	3.43	1.31	1.23	1.93	2.64	3.94	5.09	6.30	5.58	4.40	4.61	2.46	1.70
1880 (14 stat'ns*)	3.44	2.13	1.68	1.70	2.69	4.56	5.57	6.09	5.97	4.74	3.18	1.70	1.32
1881 (17 stat'ns*)	3.54	1.02	1.38	1.73	2.41	4.66	4.98	6.23	5.97	5.73	3.93	2.38	2.10
1882 (23 stat'ns*)	3.48	1.53	2.03	2.06	2.59	3.30	5.20	5.52	6.47	5.03	3.95	2.46	1.59
In 1882 Greater than Av. '77-82	-----	.01	.36	.09	-----	-----	-----	-----	.37	-----	.05	.14	-----
In 1882 Less than Av. '77-82	.09	-----	-----	-----	.22	.77	.10	.75	-----	.09	-----	-----	.22

NOTE.—Graphic representations of statements in Exhibit 21 are given in Diagram No. XIX., page 145.

* Thornville, Kalamazoo, Mendon, and Detroit, for each of the 6 years 1877-82,—also Tecumseh for the 5 years 1878-82; Battle Creek for the 3 years 1877-80, and for 1882; Otisville for the 3 years 1878-80, and for 1882; Marquette, Alpena, Grand Haven, Port Huron, and Lansing, for the 4 years 1878-82; Agricultural College for 1877, 1878, 1881, and 1882; Niles for 1878, 1879, 1881; Nirvana for 1878, 1879, and first 4 months of 1880; Reed City for last 8 months of 1880, and for 1881 and 1882; Benton Harbor and Coldwater for 1877, 1878; Escanaba and Washington for 1880-82; Petoskey for 1879; Winfield for 1881; Ann Arbor for 1881 and 1882; Woodmere Cemetery (near Detroit) for 3 years 1877-80; Traverse City, Harrisville, Hastings, Hillsdale, Marshall, and Parkville for 1882.

FOOTNOTES TO TABLE IV., PAGE 146.—Continued.

† The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit 11, page 122.

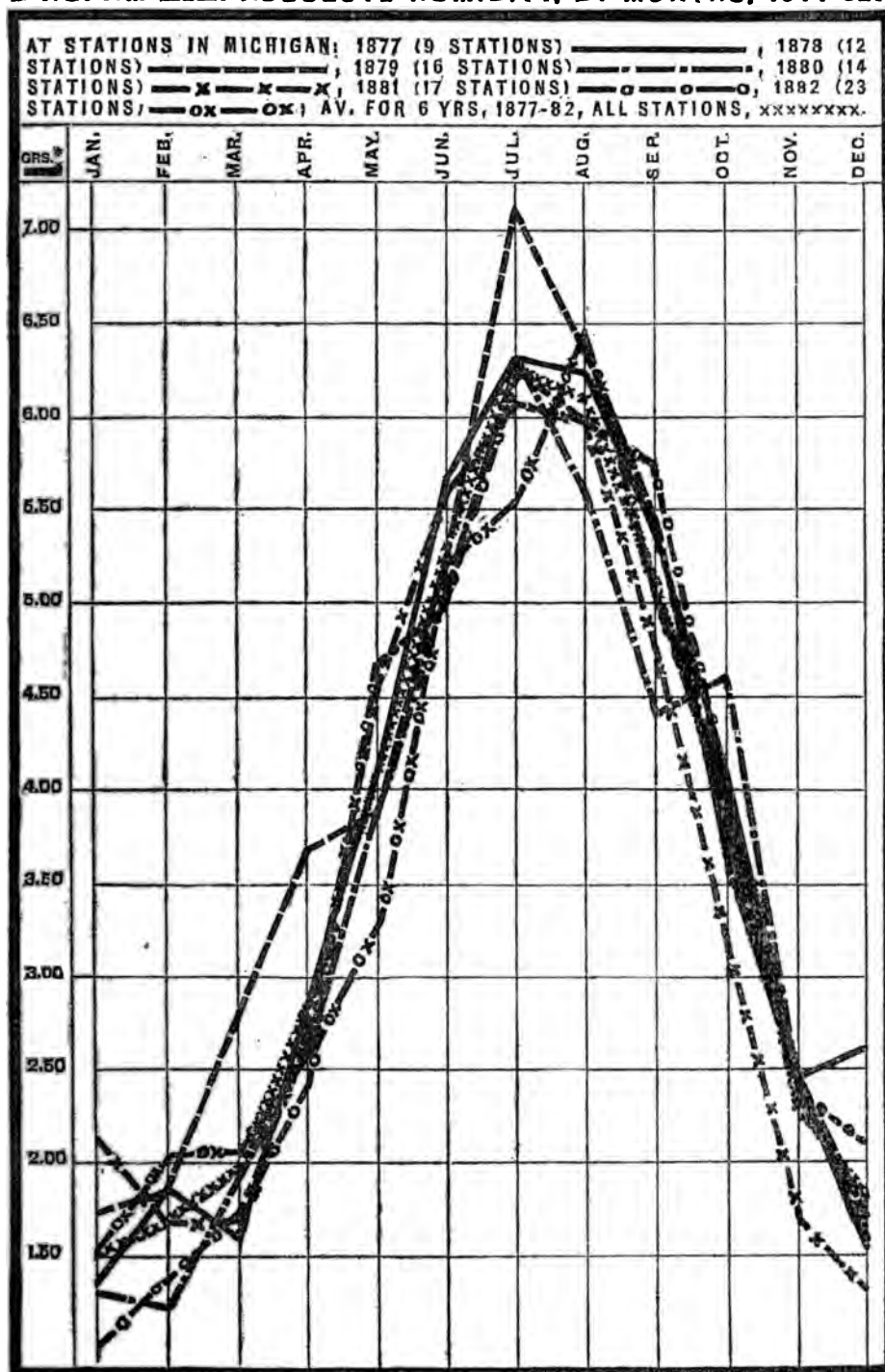
‡ The full names of the divisions and the counties in each division are stated in Exhibit 1, page 5; also in a map on page 113.

§ This line is an average for only the stations for which statements nearly complete are given for every month of the year, Winfield excepted.

|| Numbers in this column state the average annual Absolute Humidity for periods of years ending in each case with Dec. 31, 1882. The small figures above and at the right of numbers which state the Absolute Humidity, denote the number of years included in the average.

¶ The computations for months in this line were made at Ann Arbor, from Guyot's tables and formula as given in the volume of Smithsonian Misc. Collections. The number of grains of vapor in a cubic foot of air at each observation, Ann Arbor excepted, was determined from readings of the psychrometer by means of Glaisher's table, Table XII. of the Smithsonian Meteorological and Physical Tables (1869).

DIAGRAM XIX.—ABSOLUTE HUMIDITY, BY MONTHS, 1877-82.



SCALE, ONE GRAIN OF VAPOR (IN A CU. FT. OF AIR) TO 1 IN. VERTICALLY.
H. B. T. DAL.

DES. BY H. B. B.

EXHIBIT 18.--*Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each month of the Year 1882, with the Average of the Extremes, and of the Range, for the Nine Years 1873-81; also, Statement of the Extremes and of the Range for each of the Nine Years, 1873-81. Observations made with Registering Thermometers (except for the first two months of 1873, and for those two months with an ordinary Thermometer, at 7 A. M., 2 P. M., and 9 P. M.) Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

YEAR AND MONTHS	EXTREMES AND RANGES OF TEMPERATURE,—DEGREES F.																																			
	1873.			1874.			1875.			1876.			1877.			1878.			1879.			1880.			1881.			Average for 9 years, 1873-81.*			1882.			1889 Higher (+), OR LOWER (-), THAN AV. 9 YRS., 1873-81.		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.						
Year	94	-30	124	101	-7	108	94	-33	127	96	-19	115	93	-14	107	98	-7	105	97	-18	115	94	-17	111	100	-17	117	96	-18	114	89	-10	99	-7	+8	-15
Av. Mo....	74	15	59	77	15	62	75	10	64	74	19	56	74	20	54	73	22	51	76	15	61	74	20	54	73	22	52	74	18	57	72	23	49	-2	+5	-8
Jan.	43	-30	73	59	-7	66	35	-13	48	65	6	59	52	-9	61	48	-4	52	44	-18	62	62	9	53	37	-9	46	49	-8	58	50	-2	52	+1	+6	-6
Feb.	49	-13	62	48	-1	49	42	-33	75	59	-1	60	56	10	46	55	-7	62	41	-6	47	59	-2	61	48	-17	65	51	-8	59	57	12	45	+6	+20	-14
Mar.	57	-12	69	67	8	59	75	-11	86	60	0	60	51	-14	65	73	18	54	66	4	62	55	6	49	50	9	41	61	1	61	66	16	50	+5	+15	-11
Apr.	82	24	58	68	3	65	80	0	80	74	16	58	81	18	63	75	29	46	81	12	69	76	20	56	83	9	74	78	15	63	73	21	52	-5	+6	-11
May	84	27	57	96	21	75	89	24	65	80	31	58	90	26	64	77	29	48	91	25	66	87	40	47	89	33	56	88	28	60	79	28	51	-9	=	-9
June	94	42	52	95	34	61	89	33	56	86	42	53	89	40	49	94	39	55	95	33	62	92	41	51	86	40	46	92	38	54	87	44	43	-5	+6	-11
July	92	44	48	98	43	55	92	44	48	96	46	50	91	43	48	98	47	51	97	47	50	94	50	44	95	52	43	95	46	49	89	47	42	+1	-7	-14
Aug.	94	44	50	101	41	60	93	35	58	96	38	60	93	43	50	93	42	51	96	34	62	88	43	45	100	46	54	95	40	54	89	49	40	-6	+9	-5
Sept.	89	26	63	95	30	65	94	26	68	80	36	44	85	38	47	92	31	61	85	27	58	88	30	58	97	43	54	89	32	58	85	32	53	-4	=	-6
Oct.	79	16	63	76	16	60	77	18	59	75	19	56	87	26	61	82	21	61	87	15	72	76	24	52	75	30	45	79	21	59	77	24	53	+3	+8	+1
Nov.	56	1	55	70	3	67	60	2	58	62	12	50	55	4	51	52	15	37	75	13	62	62	-4	86	64	12	52	62	6	55	70	14	56	+8	+8	-5
Dec.	64	10	54	50	-6	56	70	-1	71	41	-19	60	58	13	45	56	-2	38	58	-3	61	47	-17	64	56	12	44	53	-1	55	40	-10	50	-9	-5	

* For the nine years 1873-81, the highest temperature was 101°, August 11, 1874; the lowest was -38°, February 8, 1876, and the range was 134°, F.

The average temperature at each of 24 stations in Michigan, and the average for 22 of these stations, in 1882 and in each month of that year, are stated in Table I., page 134. Seven of the lines in this table are represented in Diagram I., page 135.

A comparison, by months, of temperature in 1882 with the averages for corresponding months in the preceding 18 years (1864-81), at the Agricultural College, near Lansing, is given in Exhibit 15, page 130.

The average temperature by months in each of the four years 1879-82, at Lansing, and a comparison of 1882, by months, with that average, are stated in Exhibit 16, page 130. In Diagram XVII., page 131, the average for four years at Lansing is compared by months with the average for the same period at all stations in the State. For every month of this period of four years the temperature observed at Lansing was higher than the average for all stations in the State, as may be seen by comparing Exhibits 16 and 17. This may, in part, be due to the influence of the capitol building, near which the thermometer in use at Lansing is placed.

The average annual and monthly temperature at from 12 to 32 stations per year for each of the six years 1877-82, and for the entire period, is stated in Exhibit 17, page 132, in which is also given, by months, a comparison of 1882 with the average for the period. The several lines in Exhibit 17 are represented, drawn to scale, in Diagram XVI., page 133.

The highest and the lowest temperature at the Agricultural College in every month of the 10 years 1873-82, and comparisons of months in 1882 with the average highest and lowest temperatures, by months for the preceding nine years, are stated in Exhibit 18, page 136.

The average daily range of temperature at from 6 to 17 stations per year by months in each of the four years 1879-82, and a comparison of 1882 with monthly averages for the period, are given in Exhibit 19, page 138. The first five lines of this exhibit are represented in Diagram XVIII., page 139.

The highest and the lowest temperatures in every month in 1882, at each of 23 stations, are stated in Table II., pages 140-1.

The average daily range of temperature by months in 1882, at each of 17 stations, and the average for the 17 stations, are stated in Table III., page 142. The lines for 10 of these stations are represented in Diagram II., page 143. It will be noticed that the greatest average daily range occurs during the warm months.

EXHIBIT 22.—*Comparison of the Average Relative Humidity of the Air (Per Cent of Saturation) for the Year and for each Month of the Year 1882, with Averages for the 18 Years 1864-81, and for 1882.—Observations made at 7 A. M., 2 P. M., and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

YEARS, ETC.	Annua- l Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 18 yrs. 1864-81	79	85	85	84	71	69	76	74	77	80	80	82	86
1881.....	79	81	93	86	71	71	78	73	70	73	84	79	84
1882.....	79	89	75	77	67	66	72	72	83	83	81	85	92
In 1882 Greater than Av. 18 yrs. 1864-81.....	0	4	-----	-----	-----	-----	-----	-----	6	3	1	3	6
In '82 Less than Av. 18 years, 1864-81.....	0	-----	10	7	4	3	4	2	-----	-----	-----	-----	-----
In 1882 Greater than in 1881.....	0	8	-----	-----	-----	-----	-----	-----	13	10	-----	6	8
In '82 Less than in 1881.....	0	-----	18	9	4	5	6	1	-----	-----	3	-----	-----

EXHIBIT 23.—*Average Relative Humidity, by Year and Months, in 1882, compared with Annual and Monthly Averages for the 4 Years, 1878-1882.**

YEARS, ETC.	PER CENT OF SATURATION,—RELATIVE HUMIDITY.												
	Ann. Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average 5 years 1878-82.....	75	81	79	76	68	66	71	72	74	75	76	79	82
1878 (11 Stat'ns*)	77	83	80	79	71	69	71	76	74	76	75	79	86
1879 (16 Stat'ns*)	74	82	80	75	66	63	70	70	70	76	74	80	83
1880 (14 Stat'ns*)	73	79	75	70	67	65	70	74	75	74	75	77	81
1881 (17 Stat'ns*)	75	79	81	79	68	67	72	69	69	74	80	79	80
1882 (22 Stat'ns*)	76	81	77	77	68	67	71	70	81	77	76	79	82
In 1882 Greater than Av. 1878-82	1	0	-----	1	0	1	0	-----	7	2	0	0	0
In 1882 Less than Av. 1878-82	-----	-----	2	-----	-----	-----	-----	2	-----	-----	-----	-----	-----

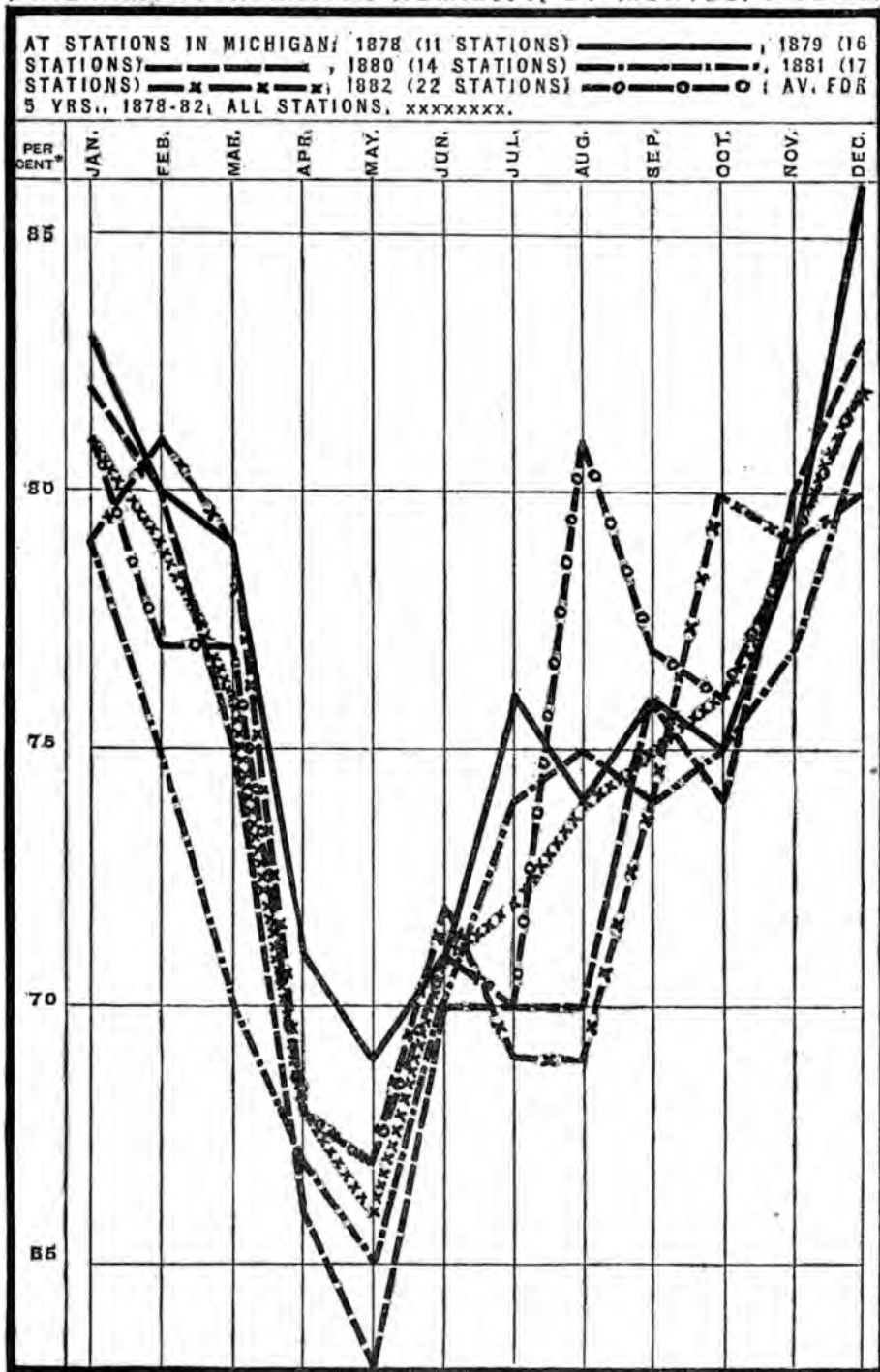
NOTE.—Graphic representations of statements in Exhibit 23 are given in Diagram No. XX., page 149.
 * Thornville, Kalamazoo, Mendon, Tecumseh, and Detroit for the 5 years 1878-82; also Otisville for 4 years 1878-80 and 1882; Nirvana for 1878, 1879; Nirvana and Reed City for 1880; Reed City and Ann Arbor for 1881, 1882; Niles for 1878, 1879, 1881; Marquette, Alpena, Grand Haven, Port Huron, and Lansing for 4 years 1879-82; Battle Creek for 1878, 1879, 1882; Woodmere Cemetery for 1878, 1879; Agricultural College for 1878, 1881, 1882; Escanaba and Washington for 1880-82; Coldwater for 1878; Potoskey for 1879; Hudson and Mallory Lake for 1881; Marshall, Hilledale, Hastings, Harrisville, and Traverse City for 1882.

FOOTNOTES TO TABLE V., PAGE 150—Continued.

§ Numbers in this column state the average annual Relative Humidity for periods of years ending in each case with Dec. 31, 1882. The small figures above and at the right of the numbers which state the Relative Humidity, denote the number of years included in the average.

NOTE.—The tri-daily observations with the psychrometer at Marquette, Grand Haven, and Detroit, for January to December, at Escanaba from September to December, inclusive, and at Alpena for May, 1882, were reduced (by tables in "Signal Service Order No. 41, 1881, and in instructions to Voluntary Observers," 1882, and the monthly means for those months were computed, by the observers at those stations. At Alpena also for 1882, and at the Signal Service Stations, except Escanaba, for the last six months of 1881, the observations were reduced by the same tables. In all other cases the observations were reduced by Guyot's table, in Smithsonian Meteorological Tables, or by a table substantially the same as that. Computations at Ann Arbor furnished by observer there.

DIAGRAM XX - RELATIVE HUMIDITY, BY MONTHS, 1878-82.



SCALE, TEN PER CENT OF SATURATION TO 2.76 IN VERTICALLY.
H. H. T. DEL. DES. BY H. H. H.

TABLE V.—RELATIVE HUMIDITY.—Average Per Cent of Saturation of the Atmosphere with Vapor of Water during the Year, and during each Month of the Year 1882, at 23 Stations in Michigan.—Average of Observations made Daily at 7 A. M., 2 P. M., and 9 P. M.,* by Observers† for the State Board of Health, and for the U. S. Signal Service.

STATIONS IN MICHIGAN.† (Those of the U. S. Signal Service in Italics.)	Divi- sions of the State.†	PER CENT OF SATURATION.—RELATIVE HUMIDITY.													
		YEAR.	MONTHS, 1882.												
			Normal.	1882.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 23 stations†			76	81	77	77	68	67	71	70	81	77	76	79	82
Marquette	U. P.	69 ⁴	71	70	72	73	67	58	63	68	80	78	72	75	73
Escanaba	U. P.	74 ³	76	81	80	79	70	67	69	73	82	80	77	77	80
Traverse City	N. W.	83 ⁴	94	86	84	72	69	76	70	88	85	84	90	95	
Alpena	N. E.	75 ⁴	76	78	75	78	69	65	73	72	85	79	76	81	83
Harrisville	N. E.	65 ⁴	61	66	68	59	64	65	64	75	68	66	61	58	
Grand Haven	W.	75 ⁵	76	82	79	79	67	65	73	73	81	76	76	74	82
Reed City	W.	69 ⁴	71	67	65	64	61	66	66	75	83	80	75	75	73
Port Huron	B. & E.	76 ⁵	79	87	82	80	77	72	74	73	82	77	77	84	87
Thornville	B. & E.	79 ⁵	77	89	79	80	69	66	72	67	80	76	64	84	94
Agricultural College	C.	79	89	75	77	67	66	72	72	83	83	81	85	92	
Hastings	C.	77 ⁴	83	74 ^k	78	71 ^d	65 ^d	72	73	82	81	78	81 ^h	86 ^d	
Lansing	C.	70	71	79	70	71	62	59	67	62	75	73	71	77	83
Otseville	C.	80 ²	90	84	83	75	70	74	70	81	79	82	84	83	
Winfield	C.	80 ²	80	89 ^m	81 ⁿ	79	70	68	76	74	84	83	82	84	89
Ann Arbor	S. C.	78	80	86 ^d	86 ^k	84 ^b	74 ⁱ	73 ^c	77 ^g	75 ^h	85	78 ^e	79 ^f	81 ^l	81 ^g
Battle Creek	S. C.	69	65	79	70	64	63	70	64	75	72	72	72	75	
Hillsdale	S. C.	73 ⁵	73	73	72	64	66	71	72	80	76	75	74	77	
Kalamazoo	S. C.	72	72	78	72	71	63	63	70	69	77	73	73	75	79
Marshall	S. C.	78 ⁵	85	86	84	74	68	74	67	78	76	77	82	84	
Mendon	S. C.	78	79	88 ^b	82 ^j	78	73 ^f	74 ^a	75 ^l	76	83 ^d	77 ^h	80 ⁱ	82 ^a	85 ^a
Parkville	S. C.	83 ⁵	91	85	87	75	68	75	84	84	80	81 ^a	90	99	
Tecumseh	S. C.	78 ⁵	80	87	82	82	73	74	75	74 ^b	82	78	83	83	88
Detroit	S. E.	71 ³	72	78	72	73	65	66	66 ^d	67	77	75	71 ^a	71	78
Washington	S. E.	78	79	86	82	81	69	69	72	70	85	79	81	85	89

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly under the numbers from which they refer to the notes below.

a For 92 observations. b For 91 observations. c For 90 observations. d For 89 observations.
 e For 88 observations. f For 87 observations. g For 86 observations. h For 85 observations.
 i For 84 observations. j For 83 observations. k For 80 observations. l For 78 observations.
 m For 66 observations. n For 66 observations.

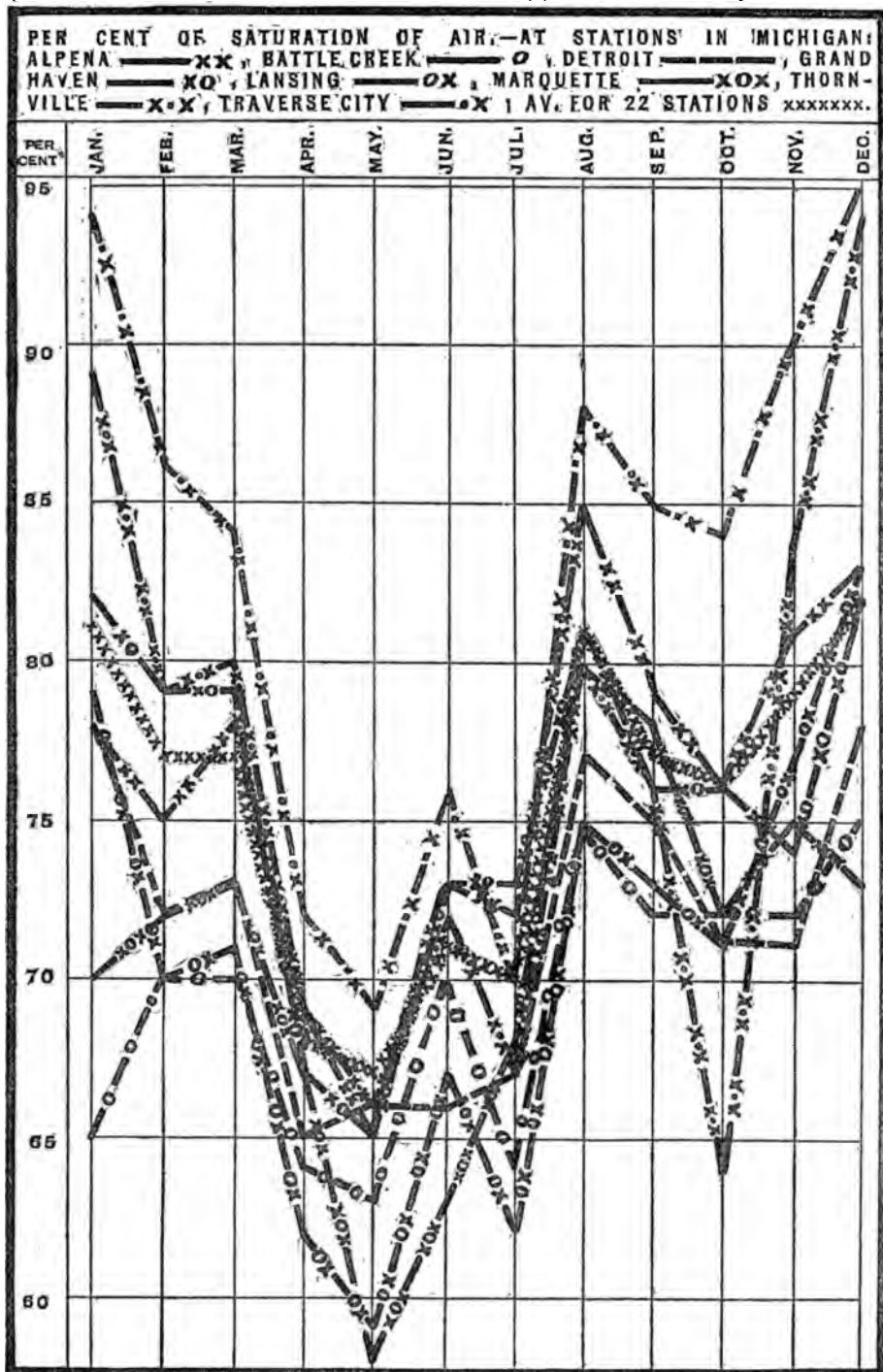
* At the stations of the U. S. Signal Service for the last six months of 1881, and for the year 1882, the observations were made at 7 A. M., 3 P. M., and 11 P. M., Washington mean time. The corresponding local time for each of these stations is stated in the star (*) foot-note to Table IV., page 151.
 † The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 11, page 122. The full names of the divisions and the counties in each division are stated in Exhibit 1, page 6.

‡ This line is an average for only the stations for which statements nearly complete are given for every month of the year. It does not include Parkville or Winfield.

[Footnotes to Table V. are continued on page 148.]

Graphic representations of 8 representative lines in this table are given in Diagram IV., page 151.

DIAGRAM IV.—RELATIVE HUMIDITY, BY MONTHS, IN 1882.



SCALE, TEN PER CENT OF SATURATION TO 1 IN. VERTICALLY.
 H. B. C. DEL. DES. BY H. B. C.

FOGS.

For the year 1882 fog was reported at 235 observations in the morning, at 28 afternoon observations (at about 2 P. M.), at 57 evening observations (at

EXHIBIT 24.—*Number of Different Days on which Fog was Observed at One or more of 27 Stations* in Michigan in 1882, and in each Month of the Year 1882.*

Year, 1882.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
109	8	7	6	1	7	8	6	15	20	19	6	6

NOTE.—Graphic representations of statements in Exhibit 24 are given in Diagram No. V., page 180.
 * This exhibit contains statements only for those localities from which reports were received for every month of the year, as follows: Marquette, Escanaba, Traverse City, Alpena, Harrisville, Grand Haven, Reed City, Port Huron, Thornville, Agricultural College, near Lansing, Hastings, Lansing, Otisville, Winfield, Ann Arbor, Battle Creek, Hillsdale, Kalamazoo, Marshall, Mendon, Parkville, Tecumseh, Detroit, and Washington. At one of the stations, Battle Creek, no fog was reported.

EXHIBIT 26.—*Number of Different Days on which Fog was recorded in 1882, at 27 Stations*

STATIONS IN MICHIGAN.*	No. of Days in 1882.	JANUARY.		FEBRUARY.		Line Number.
		Day of Month.	Hour of Observation.	Day of Month.	Hour of Observation.	
			A. M.		P. M.	
Marquette.....	12					1
Escanaba.....	9			27	6:20	2
Harbor Springs.....	† (2)			28		3
Traverse City.....	8	26	7	26		4
Alpena.....	26	26	10 to	26, 28		5
Harrisville.....	1			27	10 to	6
Grand Haven.....	21	26	6:23			7
Reed City.....	13	8	7	26	6:23	8
Port Austin.....	‡ (5)	26	7	27	7	9
Port Huron.....	20	8, 26	6:38	19	6:38	10
Thornville.....	13					11
Agricultural College.....	9	26	7	26		12
Hastings.....	13			28		13
Ionia.....	§ (34)	12, 26	7			14
Lansing.....	18	12	7	26		15
Otisville.....	12	26	7 to 10:15			16
Winfield.....	16	26	7	26		17
Niles.....	|| (4)					18
Ann Arbor.....	25			9, 19, 25	7	19
Hillsdale.....	14	5, 7	7			20
Kalamazoo.....	2					21
Marshall.....	1					22
Mendon.....	8	12	7			23
Parkville.....	28	7, 12, 26	A. M.			24
Tecumseh.....	9			9	7	25
Detroit.....	17	8, 13, 26	6:36	9, 19	6:36	26
Washington.....	23	10, 26		16		27
		8, 13	7	16	2:36	28
		21, 26	7	19	7	29

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 11, page 122.

† Only one report was received from Harbor Springs,—February.

‡ Only two reports were received from Port Austin,—May, and October.

about 9 P. M.), and 36 times during the day, no special time being mentioned, in many cases the same fog, or fog at the same time, being reported by different observers. Fog was reported, at one or more stations, at sometime during the day, on 109 days, as follows: on 89 days in the morning, on 15 days at about 2 P. M., and on 33 days at night.

EXHIBIT 25.—*Number of Observations at which Fog was Observed in Michigan in 1882, and in each Month of the Year 1882. (Observations taken 3 times Daily at 27 Stations.*)*

Year, 1882.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
356	31	25	10	2	21	14	8	51	44	86	55	9

* This exhibit contains statements only for those localities from which registers were received for every month of the year, as stated in a foot-note to Exhibit 24, page 152.

and in each Month the Dates and Hours of Observation when Fogs were Recorded, in Michigan.

Line Number.	MARCH.			APRIL.			MAY.			JUNE.		
	Day of Mo.	Hour of Observation.		Day of Mo.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
1							8	2:19, 10:19		14		10:19
2							9	6:19		15, 17	6:19	
3	18		2:20				8	10:20		23		10:20
4												
5												
6												
7							4, 9	7		8	7	
8	26		Night**	6	5 †		9	5 to 8:30		14		10:20 to 11
9	27	to 8:50					29	10 to 11:30		16	6 to 8:20	
10										18	8 to	1:50
11												
12	1, 2	6:23					4	6:23				
13	18		2:23				8		9			
14												
15												
16							8 to 9	10 of 8th	to 1 of 9th			
17							8	10:26		18	6:26	
18							9, 21	6:26				
19	18		after 3				8	Night				
20												
21							4	7		29	7	
22												
23	26		6:15									
24												
25				6	7							
26												
27							25					
28							10	7		18	7	
29												
30												
31												
32												
33							25					
34												
35	9	6:26	2:26				9	10:26		18	6:26	
36												
37							4, 9	7		18	7	
38							8		9			

‡ Monthly registers were received from the State House of Correction for every month except May, but no fogs were reported there after January. From Rev. J. Pierson, Ionia, registers were received from August to December, inclusive.

§ Only two reports were received from Miles,—May and August.

† Lifted in night.

** Till next morning.

EXHIBIT 26.—CONTINUED.—*Dates when*

STATIONS IN MICHIGAN.*	JULY.		AUGUST.			SEPTEMBER.			Line Number.	
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		
		A. M.	P. M.		A. M.	P. M.		A. M.		P. M.
Marquette.....	8		10:19	15,16,26 15,23 15 24	6:19	2:19 10:19				1 2 3 4
Escanaba.....				24	7		5	6 to 7:30		5 6 7
Traverse City.....				24,25 24	7 6 to 9		30	6:20		8 9 10
Alpena.....				26 28 29		10:34 9 to 11:30 4 to 8	5 8 17	4:30 to 9:40 4 to 9:30	11	11 12 13 14 15 16 17 18 19
Harrisville.....										20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
Grand Haven.....	8	6:23		16,24,26 25	6:23 6:23	10:23	16,30	6:23		
Reed City.....				24,28	7		7	7		
Port Austin.....										
Port Huron.....	18	6:38		25	6:38		6,7,16	6:38		
Thornville.....				6,24,25,26, 27	A. M.		28	A. M.		
Agr'l College.....							5,20	7		
Hastings.....				24,26	7		15	7		
				6,7 18	5 to 10 5 to 7		5,24 6,7,8,9,12, 20	5 to 7 5 to 7:30		
Ionia.....				25,29	5 to 8		16	5 to 8		
				24	7 to 7:15		5 20,21,29	to 8 7		
Lansing.....										
Otisville.....				27	7		5,15,24,29	7		
							5 6 12 13 18 19	to 5:30 A. M. to 7:30	** 8:30 ** Eve.	
Winfield.....									9 P. M.	
Niles.....				24,25,26	A. M.			A. M.		
Ann Arbor.....	9	7		5,6,25	7		2,4,29,30	7		
Hillsdale.....				17 24,31	7		20,28,30	7		
Kalamazoo.....										
Marshall.....				5,16,18,24, 26						
Mendon.....										
Parkville.....	20,21,22			5,6,16,18,22 24,25,26			5,6,15,16,20			
Tecumseh.....				24	7					
Detroit.....										
Washington.....	18	7		6	7		29	7		

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit 11, page 122.

Fogs were Recorded in 1882.

Line Number.	OCTOBER.			NOVEMBER.			DECEMBER.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
1	1	6:19							
2	4		10:19						
3									
4	21	6:20							
5									
6	2,5	7							
7	1		10:34 to 11:50	7	5 to 10:30				
8	4	5 to 9:15		9		7:30 to 9:30			
9	14	6 to 7:40		10	4:30 to 10	† 6			
10	21	6 to 9		11	to 12:15	† 7:30			
11	28	5 to 8							
12				10		6			
13	1,4,18	6:23		7,10	6:23				
14				8		10:23			
15				9	6:23	10:23			
16	5,14,17	7		9,10	7				
17	4	7		9	7				
18	5		2						
19	2,4,6,15,18,20,21	6:38		9		10:38			
20	4,6,18	A. M.		9	Day.	Night.			
21	17		Eve.						
22	3,4,24	7		9	7	2			
23				10	7				
24	1,17,18,24,26	7					26		9
25	3		9						
26	2,10,14,18	5 to 8		1	6:30 to 10:30				
27	3	7:30 to 12		5	5 to 9				
28	4	5 to 11		7,8	6 to 8				
29	5,6	5 to 9		9	** 5				
30	17	6 to 8		10	to 12 m.				
31	19		** 6 to 12						
32	20	to 8							
33	26	6 to 11							
34	3	to 9		8		** 9			
35	4	7 to 9		9	to 9:30	2,9			
36	6	7 to 7:30		10	7				
37	10	to 7:30							
38	18	7							
39	24	to 8:30							
40	4,5	7		7,9,10	7				
41	1,10	A. M.		9	4 to 7:30		18	8:15 to 9:30	
42	2		Night.	10	7 to 7:45				
43	3	A. M.	9						
44	4	7							
45	28	6 to 8							
46									
47									
48	1,4,5,6,7,10,18,28	7		8,9,10,20	7				
49	1,3	7		8		Night.			
50	4			9,10	7 to	Night.			
51							27,29		
52	3	7							
53	1	7		9	7				
54	1,3,10,17,18,24,26			9					
55	1,4,6,7	7		8,9,10	7				
56	4,6,10,21	6:36		8,10	6:36				
57				9		2:36, 10:36			
58	1,6,15	7		8	7	2,9	21		2,9
59	16,18,22	7		9	7	9	22	7	

† Lifted in night.

** Till next morning.

EXHIBIT 27.—*Comparison of the Average Per Cent of Cloudiness in the Year and in each Month of the Year 1881, with Averages for the 18 Years 1864-81, and for the Year 1881. Observations made at 7 A. M., 2 P. M., and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

YEARS, ETC.	PER CENT OF CLOUDINESS.												
	Annu- al Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 18 yrs., 1864-81.....	58	72	64	64	56	50	50	46	47	50	59	67	76
1881.....	57	65	68	67	49	37	58	38	40	50	67	74	67
1882.....	59	72	56	68	57	53	53	43	54	43	50	75	86
In 1882 Greater than Av. 18 yrs., 1864-81.....	1	0	---	4	1	3	3	---	7	---	---	8	10
In 1882 Less than Av. 18 yrs., 1864-81.....	---	---	8	---	---	---	---	3	---	7	9	---	---
In 1882 Greater than in 1881.....	2	7	---	1	8	16	---	5	14	---	---	1	19
In 1882 Less than in 1881.....	---	---	12	---	---	---	5	---	---	7	17	---	---

EXHIBIT 28.—*Average Per Cent of Cloudiness, by Year and Months, in 1882, compared with Annual and Monthly Averages for the 6 Years, 1877-82.**

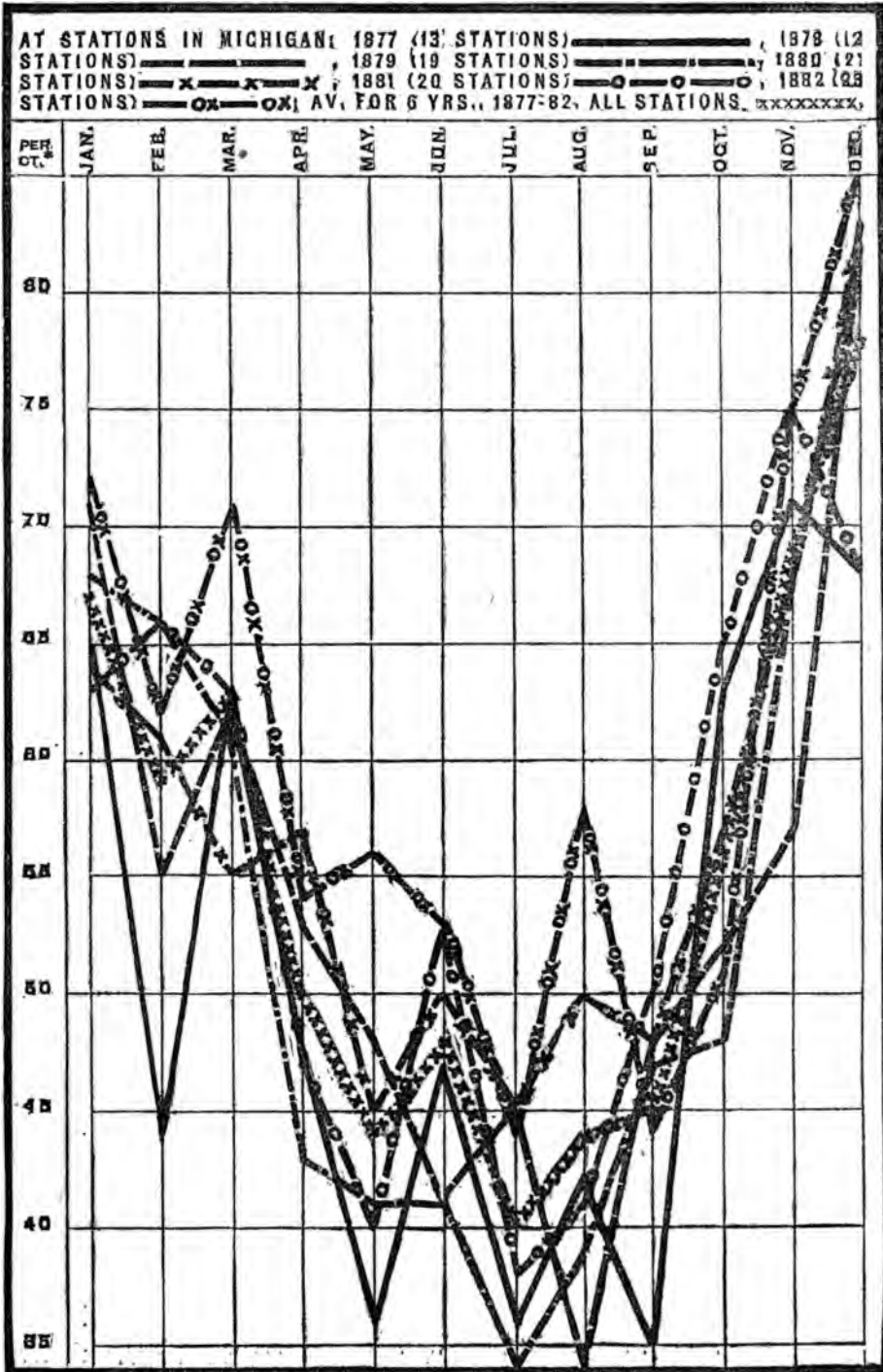
YEARS, ETC.	PER CENT OF CLOUDINESS.												
	Annu- al Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 6 years, 1877-82.....	55	67	59	63	50	44	48	40	44	45	56	69	78
1877 (13 stations*).....	51	65	44	63	47	36	47	36	42	35	63	71	68
1878 (12 stations*).....	54	71	55	62	53	48	41	45	34	48	52	57	83
1879 (19 stations*).....	53	68	66	61	43	41	41	34	39	47	48	68	82
1880 (21 stations*).....	57	64	61	55	57	45	50	45	50	48	57	68	83
1881 (20 stations*).....	56	63	66	63	47	40	53	38	41	50	65	75	68
1882 (23 stations*).....	61	72	62	71	54	56	53	44	58	44	51	75	85
In 1882 Greater than Av., 1877-82....	6	5	3	8	4	12	5	4	14	---	---	6	7
In 1882 Less than Av. 1877-82.....	---	---	---	---	---	---	---	---	---	1	5	---	---

NOTE.—Graphic representations of statements in Exhibit 28, are given in Diagram XXIV, page 157.
 * Thornville, Kalamazoo, Mendon, and Tecumseh, for the 6 years 1877-82, also Battle Creek for 1877-80, and for 1882; Nirvana for 1877-79, and first 4 months of 1880; Reed City for last 8 months of 1880, and for 1881-82; Detroit for 1877, and for 1-79-82; Niles for 1878-81; Benton Harbor for 1877, 1878, 1880; Coldwater and Woodmere Cemetery for 1877-79; Otisville for 1878-80, and for 1882; Marquette, Alpena, Grand Haven, Port Huron, Lansing, and Washington, for 1879-82; Ypsilanti for 1877, 1879; Agricultural College for 1877, 1881, 1882; Petoskey for 1878-9; Escanaba and Ann Arbor for 1880-82; Fire Lake for 1877; Ionia and Adrian for 1880; Hillsdale for 1880 and 1882; Marshall and Parkville for 1881-82; Winfield, and Hudson and Mallory Lake for 1881; Harrisville, Hastings, and Traverse City for 1882.

FOOTNOTES TO TABLE VI., PAGE 158.—*Continued.*

|| Numbers in this column state the average per cent of cloudiness for periods of years ending in each case with Dec. 31, 1882. The small figures above and at the right of numbers which state the per cent of cloudiness, denote the number of years included in the average. Computations of average per cent of cloudiness were made and furnished by the observer at Ann Arbor for each month in 1882; at Marquette for June, July, and September; at Grand Haven for Jan., Feb., Mar., April, Aug., Nov., and Dec.

DIAGRAM XXIV.—AV. PER CENT OF CLOUDINESS 1877-82.



SCALE, IN PER CENT OF CLOUDINESS TO 100 IS VERTICALLY.
H. B. T. RILEY

TABLE VI.—Average Per Cent of Cloudiness for the Year, and for each Month of the Year 1882, at 23 Stations in Michigan,—Average of Observations made Daily at 7 A. M., 2 P. M., and 9 P. M.,* by Observers for the State Board of Health,† and for the U. S. Signal Service.

STATIONS IN MICHIGAN.† (Those of the U. S. Signal Service in italics.)	Division of the State.‡	Norm. ||	AVERAGE PER CENT OF CLOUDINESS.											
			Yr., 1882.	MONTHS, 1882.										
				Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov. Dec.
Av. for 23 stations.§			61	72	62	71	54	56	53	44	58	44	51	75 85
Marquette.....	U. P.	61 ⁴	63	71	77	78	60	42	47	54	51	43	62	81 85
Escanaba.....	U. P.	60 ³	63	65	75	71	55	58	53	52	61	49	63	77 76
Traverse City..	N. W.	62 ⁴	62	78	71	70	53	57	47	43	60	39	56	82 91
Alpena.....	N. E.	58 ²	63	77	70	70	51	53	48	47	60	48	57	82 90
Harrisville.....	N. E.	48 ⁴	50	61	62	51	36	40	27	30	48	39	40	80 81
Grand Haven....	W.	56 ⁵	57	69	54	70	48	49	52	35	53	40	45	74 93
Reed City.....	W.	61 ⁴	65	69	69	67	57	60	53	48	71	54	56	81 93
Port Huron.....	B. & E.	60 ⁴	63	69	65	75	57	57	59	53	64	51	49	72 85
Thornville.....	B. & E.	54 ⁶	56	64	55	69	49	55	46	38	61	38	42	66 86
Agr'l College, near Lansing.	C.	58 ¹⁹	59	72	56	68	57	53	53	43	54	43	50	75 86
Hastings.....	C.	67 ⁴	81	66	81	62	64	65	48	60	49	57	75	90
Lansing.....	C.	55 ⁴	58	66	54	66	52	55	57	45	59	38	48	71 80
Otisville.....	C.	65 ²	65	69	65	75	62	63	59	54	67	56	56	74 84
Winfield.....	C.	61 ³	64	85	70	77	63	59	60	43	58	45	51	71 88
Ann Arbor.....	S. C.	60 ³	60	72	58	75	57	55	54	40	64	41	48	72 83
Battle Creek....	S. C.	59 ⁴	73	58	71	56	56	50	36	53	38	55	78	86
Hillsdale.....	S. C.	63 ⁶	76	61	70	56	64	62	48	62	48	51	79	82
Kalamazoo.....	S. C.	67 ⁵	69	89	73	87	67	69	63	42	58	43	60	80 91
Marshall.....	S. C.	56 ⁵	60	78	58	69	52	57	53	43	52	48	46	77 84
Mendon.....	S. C.	52 ⁵	58	76	62	72	50	55	56	37	49	41	45	72 82
Parkville.....	S. C.	62 ⁶	65	79	62	77	53	62	71	49	64	48	53	77 84
Tecumseh.....	S. C.	48 ⁴	56	73	54	69	54	55	51	39	54	40	40	70 78
Detroit.....	S. E.	58 ⁴	59	72	52	72	54	55	55	44	59	43	50	69 84
Washington.....	S. E.	55 ⁴	58	66	58	69	54	55	48	42	60	46	48	67 85

* a, b, c, In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly under the numbers from which they refer to the notes below.

† For 92 observations. ‡ For 91 observations. § For 90 observations. ¶ For 89 observations.

‡ For 88 observations. § For 87 observations. ¶ For 86 observations. ¶ For 85 observations.

¶ For 84 observations. § For 83 observations. ¶ For 82 observations. ¶ For 81 observations.

¶ For 80 observations. ¶ For 76 observations.

* At stations of the U. S. Signal Service for the last six months of the year the observations were made at 7 A. M., 3 P. M., and 11 P. M., Washington mean time. The corresponding local time for each of these stations is stated in the star (*) footnote to Table IV., page 146.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit II, page 122.

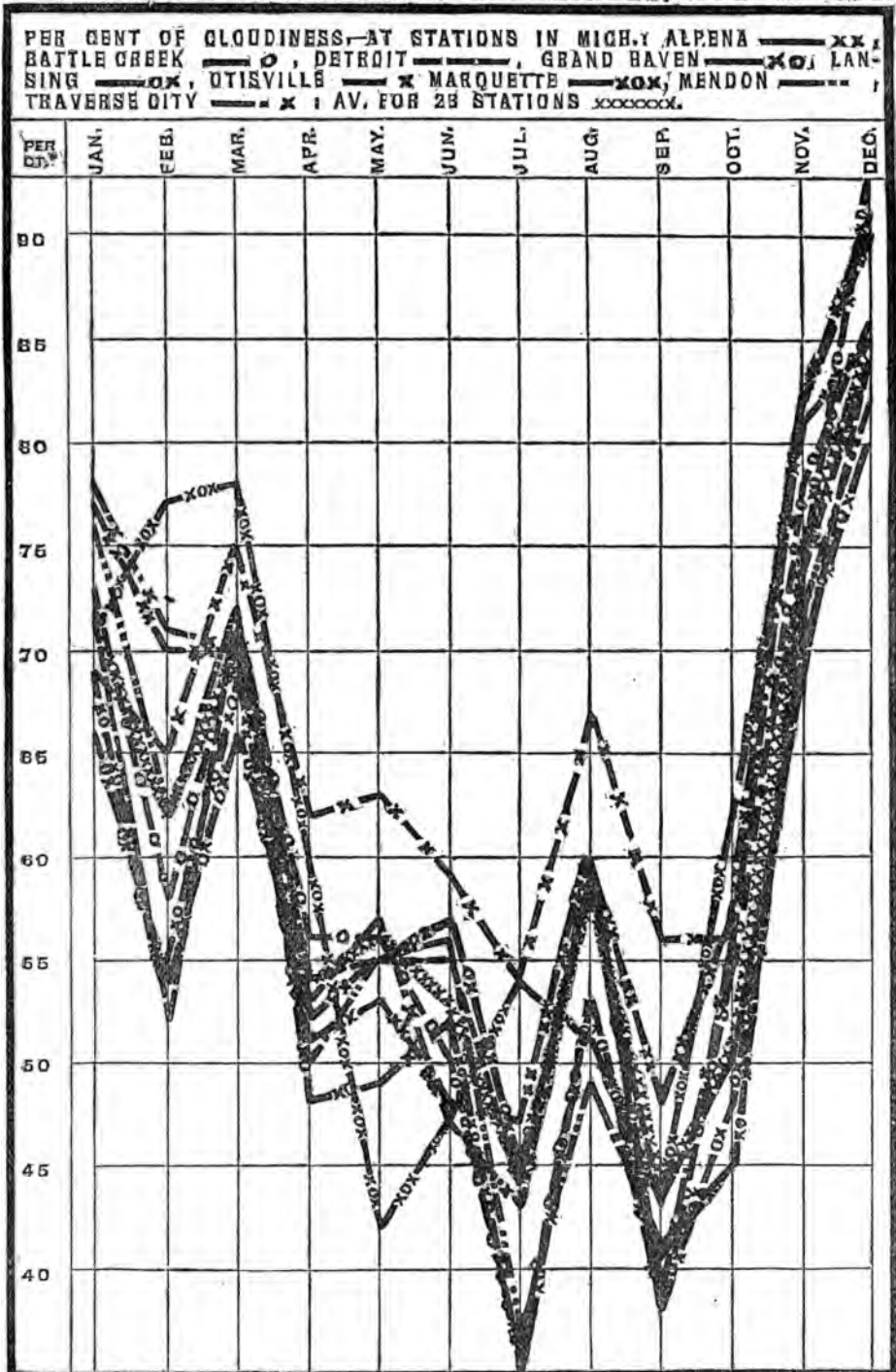
‡ The full names of divisions, and the counties in each division are stated in Exhibit I, page 5.

§ This line is an average for only the stations from which statements, nearly complete, were received for every month of the year. It does not include the line for Winfield

[Footnotes to Table VI. are continued on page 156.]

Graphic representations of 9 representative lines in this Table are given in Diagram No. VI., page 159.

DIAGRAM VI.—AV. PER CT. OF CLOUDINESS, MOS. IN 1882.



* SCALE, TEN PER CENT TO 1.1 IN. VERTICALLY. H. B. T. DEL. DES. BY H. B. B.

DIAGRAM V.—CONCERNING FOGS IN MICHIGAN, IN 1882.

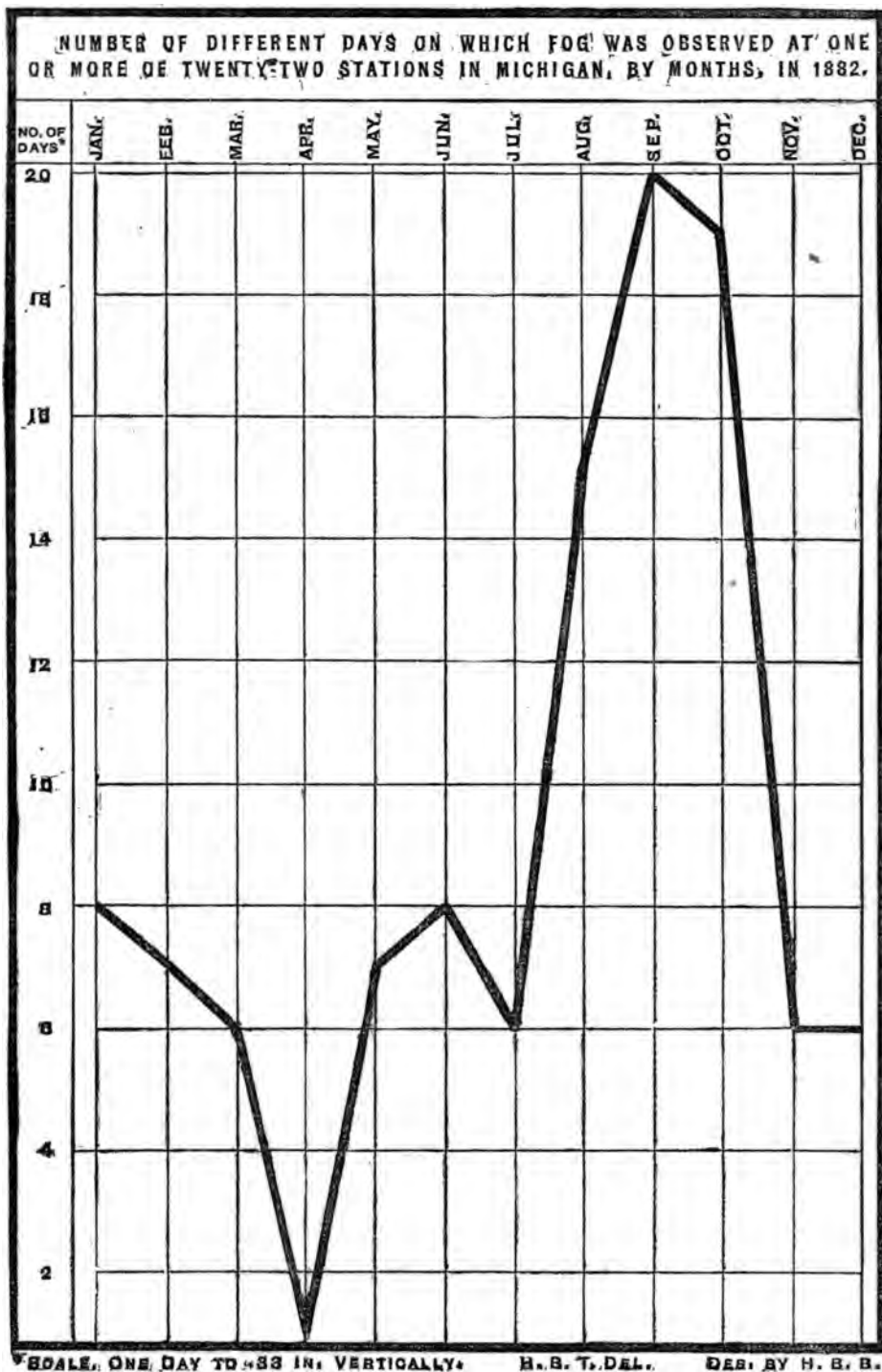


EXHIBIT 29.—Dates of Auroras Observed and Recorded at Fourteen Stations in Michigan, during the Year 1882.

STATIONS.	DATES OF AURORAS RECORDED IN 1882.											
	Jan.	Feb.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Escanaba			16,17	21			4,16,17		14,16	16,17,19,20	15,16	
Alpena			16	13,14,17	19,23	11,12,17,19	10,12,17	4,5,11	2,5,14	17,18,20,21		
Harrisville										17		
Port Austin										17		
Thornville		17	16,21	7	12			11	14	17,18,19,20		
Hastings			16,21	21					4,5,6,14			
Ionia									5	14,17,19		
Lansing	11,14,19	9	11,15,16, 20,21	20			10,16	11	5,14	16,17,19		
Winfield										17,20		
Ann Arbor										17		
Battle Creek			16									
Hillsdale										20		
Parkville										20		
Detroit			16,17				4			12,14,17,18, 19,20		

NOTE.—Comments on the April 16 aurora: "Visible from 7:50 P. M., till day."—*Alpena*. "Incandescent flashes over the whole sky."—*Thornville*. "Corona visible till 11 P. M."—*Battle Creek*. "Remarkable display April 16 and 17."—*Escanaba*. The June 12 aurora "lasted all night" at *Thornville*. "Grand display," Nov. 17, P. M.; Nov. 20, A. M.—*Winfield*. "Very brilliant," Nov. 17.—*Ann Arbor*. "Brilliant," Nov. 20.—*Hillsdale*. "A magnificent display," Nov. 17.—*Harrisville*.

METEORS.—The registers for 1882 contain records of two meteors, as follows:

May 22, remarkable, course S. W.—*Thornville*.

Aerolite, remarkably brilliant, 7 P. M., Dec. 7.—*Alpena*.

In the following statement are named for each month in 1882 the days of the month clear ("all or nearly all sunshine"), and the days "all or nearly all cloudy," as observed by Dr. J. S. Caulkins, at *Thornville*. There is also stated for each month the number of clear and the number of cloudy days as thus determined.

JAN.—Clear, Jan. 2, 4, 17, 18, 19, 20, 23, 24, 27, 29, and 30—11 days. Cloudy, Jan. 1, 3, 5, 6, 7, 8, 9, 11, 13, 14, 15, 16, 21, 25, 26, and 28—16 days.

FEB.—Clear, Feb. 2, 3, 4, 6, 8, 9, 10, 14, 15, 18, 24, 25, and 27—13 days. Cloudy, Feb. 12, 16, 17, 19, 20, 21, 22, 23, 26, and 28—10 days.

MARCH.—Clear, 1, 2, 3, 5, 8, 14, 19, 23, 28, and 30—10 days. Cloudy, March 7, 9, 10, 11, 12, 15, 18, 20, 21, 22, 25, 26, and 27—13 days.

APRIL.—Clear, 1, 2, 3, 8, 15, 16, 17, 18, 21, 23, 24, 25, 27, and 28—14 days. Cloudy, April 4, 9, 10, 11, 12, 13, 14, 19, 20, and 26—10 days.

MAY.—Clear, 2, 3, 7, 9, 14, 15, 16, 17, 18, 19, 20, 21, 25, 26, 29, and 30—16 days. Cloudy, May 4, 8, 10, 11, 12, 13, 23, 27, and 31—9 days.

JUNE.—Clear, 1, 5, 6, 7, 9, 11, 12, 13, 15, 16, 18, 21, 22, 25, 26, 27, 28, and 29—18 days. Cloudy, June, 2, 3, 4, 8, 10, 14, 17, and 30—8 days.

JULY.—Clear, 2, 4, 5, 6, 11, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 29, and 30—18 days. Cloudy, July, 1, 3, and 31—3 days.

AUG.—Clear, 11, 15, 17, 18, 24, 25, 26, 27, 28, 29, and 30—11 days. Cloudy, Aug., 1, 2, 3, 4, 8, 9, 10, and 12—8 days.

SEPT.—Clear, 3, 4, 5, 6, 7, 9, 11, 12, 14, 15, 16, 18, 22, 23, 24, 25, 26, and 30—18 days. Cloudy, Sept. 1, 8, 21, 27, and 28—5 days.

OCT.—Clear, 1, 2, 3, 4, 5, 6, 7, 8, 9, 14, 15, 18, 19, 20, 21, 24, 26, 27, and 31—19 days. Cloudy, Oct. 11, 13, 22, 23, 28, 29, and 30—7 days.

NOV.—Clear, 1, 2, 3, 4, 18, 20, and 22—7 days. Cloudy, Nov., 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 23, 24, 26, 28, 29, and 30—16 days.

DEC.—Clear, 7, 18, and 29—3 days. Cloudy, Dec., 1, 2, 3, 4, 6, 9, 10, 11, 12, 13, 14, 15, 16, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, and 31—24 days.

EXHIBIT 30.—Dates of Solar and Lunar Halos, and of Coronæ, and of Parhelia, recorded on the Monthly Registers in 1882.

STATIONS.	DATES OF HALOS RECORDED.—MONTHS IN 1882.											
	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.	
	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.
Esanaba
Alpena
Port Austin
Thoraville
Lansing
Niles
Detroit
Washington

CORONÆ. Lunar, Sept. 23 and 26; Oct. 23 and 25;—Esanaba.
 PARHELIA. Jan. 24, Feb. 10, 25, Mar. 28 (two), Nov. 25, Dec. 7 (two).—Lansing. "On the afternoon of Nov. 25, at 2:15, a remarkably peculiar sun dog was visible from the Observatory grounds. Its position was estimated to be about 40° north of the sun. The form and appearance resembled closely that of a rainbow, the arc being about 15° in length, with the convex side toward the sun. The colors were very distinct, with the red on the side toward the sun (outer side of the arc). It disappeared within 10 minutes after first observed. It was seen by J. M. Schaeberle, C. W. Carman, and F. C. Hicks."—*Astronomical Observatory, Ann Arbor.*

EXHIBIT 31.—*Comparison of the Rainfall during the Year and during each Month of the Year 1882, with that for the Year 1881; and with the Average for the 18 Years 1864-81. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

YEARS, ETC.	INCHES OF RAIN AND MELTED SNOW.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 18 yrs. '64-81	31.22	1.77	1.79	2.69	2.60	2.94	3.91	3.34	2.72	3.01	2.45	2.17	1.87
1881.....	34.66	2.27	3.77	2.66	1.73	2.11	4.37	1.81	1.63	2.91	5.56	4.09	1.75
1882.....	32.58	1.17	2.28	3.58	1.88	4.04	5.57	2.32	5.72	0.67	2.64	1.83	0.88
In 1882 Greater than Av. for 1864-81.....	1.36	-----	.49	.89	-----	1.10	1.66	-----	3.00	-----	.19	-----	-----
In 1882 Less than Av. for 1864-81.....	-----	.60	-----	-----	.72	-----	-----	1.02	-----	2.34	-----	.34	.99
In 1882 Greater than in '81	-----	-----	-----	.92	.15	1.93	1.20	.51	4.09	-----	-----	-----	-----
In 1882 Less than in '81....	2.08	1.10	1.49	-----	-----	-----	-----	-----	-----	2.24	2.92	2.26	.87

EXHIBIT 32.—*Inches of Rain and Melted Snow by Years and Months, in 1882, compared with Annual and Monthly Averages for the six Years, 1877-1882.**

YEARS, ETC.	INCHES OF RAIN AND MELTED SNOW.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 6 yrs. '77-82	38.67	1.89	2.37	2.97	2.92	3.26	4.29	3.72	3.79	3.59	3.82	3.49	2.65
1877 (13 stat'ns*)	35.24	1.57	0.03	4.22	2.83	1.49	4.60	3.06	5.00	1.62	5.02	4.23	1.58
1878 (12 stat'ns*)	38.06	1.62	2.63	3.22	3.71	3.22	2.66	5.13	3.04	3.84	3.56	2.11	3.32
1879 (12 stat'ns*)	36.38	1.16	2.26	1.94	1.74	2.28	3.31	3.76	2.17	5.97	2.31	5.37	4.11
1880 (14 stat'ns*)	41.88	2.71	1.56	1.87	5.53	5.44	4.84	5.03	4.86	2.98	2.84	2.53	1.70
1881 (17 stat'ns*)	43.21	2.31	5.01	2.88	1.53	2.67	4.90	2.84	2.03	5.11	6.29	4.48	3.16
1882 (23 stat'ns*)	37.25	1.97	2.72	3.66	2.17	4.45	5.40	2.47	5.61	1.63	2.92	2.24	2.01
In 1882 Greater than Av. '77-82	-----	.08	.35	.69	-----	1.19	1.11	-----	1.82	-----	-----	-----	-----
In 1882 Less than Av. '77-82-----	1.42	-----	-----	-----	.75	-----	-----	1.25	-----	1.96	.90	1.25	.64

* Thornville, Kalamazoo, and Detroit, for the 6 years 1877-82,—also Mendon and Tecumseh for 1877, 1878, 1880, 1881, 1882; Niles for the 4 years 1878-81; Nirvana, Coldwater, and Woodmere Cemetery (near Detroit) for 3 years 1877-79; Agricultural College for 1877, 1878, 1881, 1882; Otisville for 4 years 1878-80, 1882; Marquette, Alpena, Grand Haven, and Port Huron for 4 years 1879-82; Battle Creek and Benton Harbor for 1877, 1878; Escanaba, Lansing, and Washington for 1880-82; Fyfe Lake and Ypsilanti for 1877; Harrisville, Reed City, Winfield, Ann Arbor, and Marshall, for 1881, 1882; Hudson and Mallory Lake for 1881; Traverse City, Hastings, Hillsdale, and Parkville for 1882.

TABLE VII.—Inches of Rain and Melted Snow, for the Year and for each Month of the Year 1882, at 23 Stations in Michigan,—as compiled from Daily Observations made by Observers* for the State Board of Health, and for the U. S. Signal Service.

STATIONS IN MICHIGAN.* (Those of the U. S. Signal Service in Italics.)	DIVISION OF THE STATE.†	INCHES OF RAIN AND MELTED SNOW.													
		YEAR.		MONTHS, 1882.											
		Norm. §	1882.	Jan.	Feb.	Mar.	Apr.	May.	J'ne.	J'ly.	Aug.	Sep.	Oct.	Nov.	Dec.
Av. for 23 stat'ns‡	-----	-----	37.25	1.97	2.72	3.66	2.17	4.45	5.40	2.47	5.61	1.63	2.92	2.24	2.01
<i>Marquette</i>	U. P.	32.81 ¹¹	37.08	1.10	3.41	2.75	2.48	2.88	2.69	2.76	3.62	5.89	5.34	1.61	2.55
<i>Escanaba</i>	U. P.	35.77 ¹¹	40.06	2.59	2.30	2.73	1.30	4.94	6.15	3.28	4.59	4.07	4.41	2.16	1.54
Traverse City....	N. W.	----- ¹⁰	44.53	3.89	2.99	3.40	3.02	2.29	5.55	1.86	6.58	1.36	3.62	5.77	4.20
<i>Alpena</i>	N. E.	38.49 ²	45.10	3.70	2.56	4.62	2.65	4.49	6.66	1.48	6.60	2.51	3.12	4.27	2.44
Harrisville.....	N. E.	38.36 ⁷	39.29	2.70	2.74	2.23	1.12	2.66	3.04	1.86	11.31	2.18	3.06	3.05	3.34
<i>Grand Haven</i>	W.	40.40 ⁴	42.16	3.59	3.09	5.85	2.17	4.04	6.05	3.72	2.77	.81	4.82	2.49	2.76
Reed City.....	W.	39.50 ⁸	34.36	2.02	2.46	2.30	2.04	3.52	4.12	1.53	5.82	1.14	2.79	4.28	2.34
<i>Port Huron</i>	B. & E.	34.98 ⁶	41.04	2.81	2.23	5.25	2.33	4.99	6.34	1.91	7.36	.88	1.76	2.23	2.95
Thornville.....	B. & E.	33.66 ¹⁹	33.57	1.56	2.29	3.32	2.22	4.45	5.71	1.48	6.53	.95	2.02	1.42	1.62
Agr'l College....	C.	31.29 ³	32.58	1.17	2.28	3.58	1.88	4.04	5.57	2.32	5.72	.67	2.64	1.83	.88
Hastings.....	C.	----- ³	39.16	.93	3.30	4.80	1.91	3.75	6.90	2.06	7.79	.67	2.83	2.04	2.18
Lansing.....	C.	38.94 ⁹	32.17	1.13	2.59	3.66	1.85	4.33	5.51	1.84	4.04	1.07	3.10	1.75	1.30
Otisville.....	C.	----- ⁹	27.80	.30	1.48	3.07	1.64	3.06	4.95	1.04	6.80	.92	2.63	.73	1.18
Winfield.....	C.	37.16 ²	32.71	1.11	3.34	3.84	2.13	4.63	5.50	2.89	3.55	1.52	1.27	.91	2.02
Ann Arbor.....	S. C.	38.07 ¹¹	36.21	1.29	2.29	3.88	1.36	5.06	5.77	2.51	6.81	2.17	2.08	2.14	.85
Battle Creek.....	S. C.	----- ¹¹	31.44	-----	-----	-----	1.93	-----	8.00	5.95	9.92	.67	1.92	1.78	1.27
Hillsdale.....	S. C.	----- ⁶	35.66	1.40	2.28	3.10	2.66	6.21	5.39	3.10	2.33	2.07	3.84	1.84	1.44
Kalamazoo.....	S. C.	41.02 ²	32.75	1.62	3.09	3.52	1.82	5.32	5.42	1.99	3.25	.41	2.26	1.24	2.81
Marshall.....	S. C.	38.14 ³	36.11	1.97	3.41	4.04	2.41	5.22	5.10	2.52	3.57	.88	3.71	1.67	1.61
Mendon.....	S. C.	45.63 ²	44.32	2.08	3.28	3.83	3.06	5.94	6.76	5.80	6.54	.53	2.84	2.08	1.58
Parkville.....	S. C.	52.97 ³	52.05	3.06	4.04	4.62	3.84	6.45	7.65	5.35	8.09	1.08	2.87	2.23	2.77
Tecumseh.....	S. C.	42.92 ¹¹	36.29	1.73	3.28	3.83	2.85	4.41	4.06	2.89	4.78	2.19	1.86	2.88	1.53
<i>Detroit</i>	S. E.	36.45 ³	30.31	1.97	1.91	3.34	1.13	4.82	3.70	1.65	4.43	1.77	2.43	1.66	1.50
Washington.....	S. E.	35.87 ³	31.42	1.50	1.98	2.63	1.95	4.96	5.60	1.06	6.18	1.75	1.90	1.16	.75

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 11, page 122.

† The names of divisions, and the counties in each are stated in Exhibit 1, page 5.

‡ This line is an average for the 23 stations from which statements were received for every month of the year. It does not include the line for Battle Creek.

§ Numbers in this column state the average annual rainfall for periods of years ending in each case with Dec. 31, 1882. The small figures above and at the right of numbers which state the rainfall, denote the number of years included in the average.

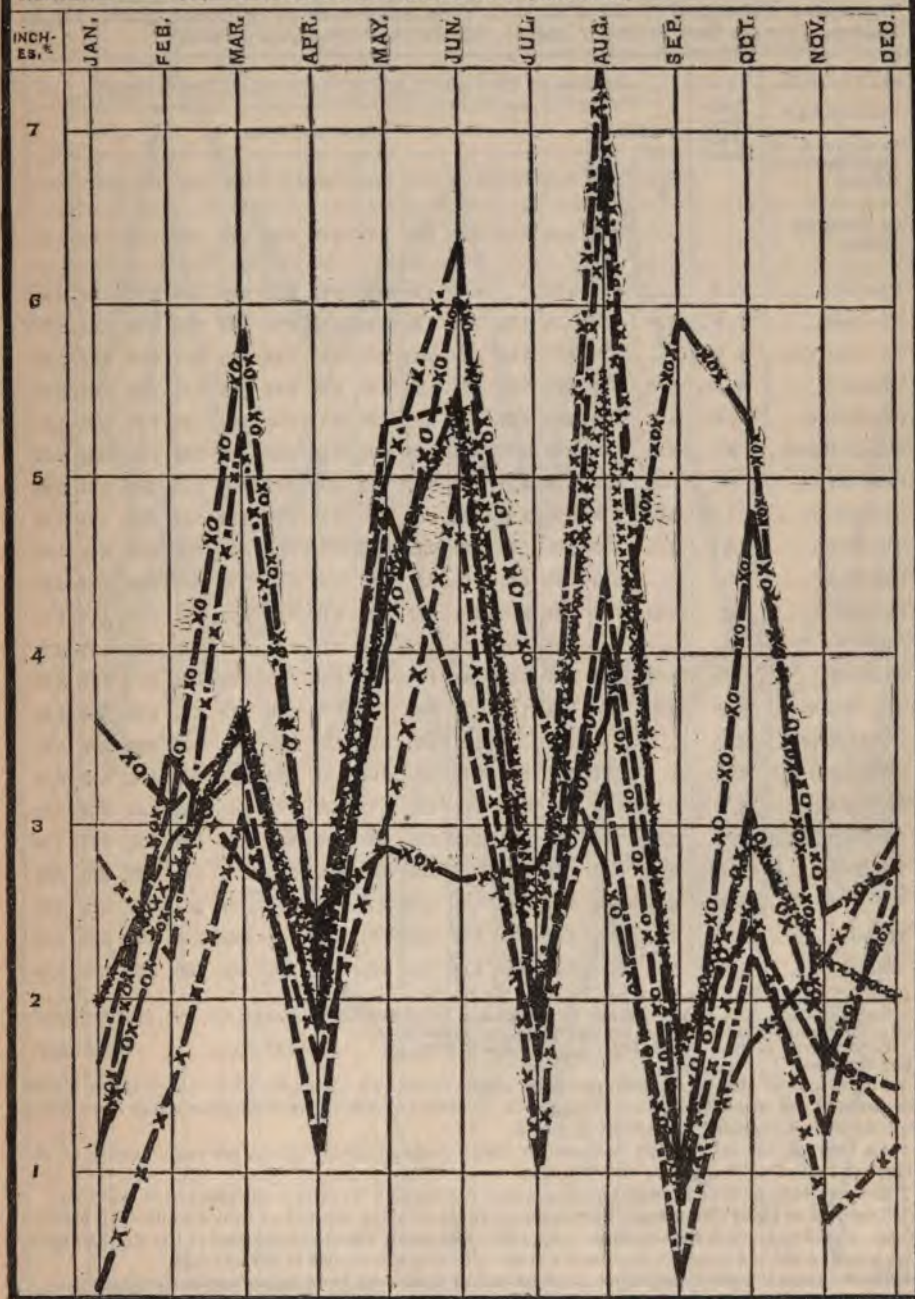
|| Total, not for the year, but for the months in 1882 represented in this line.

NOTE.—Computations of amount of rain-fall were furnished by the observer at Marquette, Grand Haven, and Ann Arbor for the year; at Escanaba, Feb. to Dec., inclusive, and at Alpena for May.

The lines for 7 representative stations in Table VII. are graphically represented in Diagram VII., page 165.

DIAGRAM VII.-RAINFALL, BY MONTHS IN 1882.

INCHES OF RAIN AND MELTED SNOW, -AT STATIONS IN MICHIGAN:
 DETROIT ———, GRAND HAVEN —XO, KALAMAZOO ———
 LANSING —OX, MARQUETTE —XOX, OTISVILLE —X, PORT
 HURON —X, AV. FOR 23 STATIONS' XXXXXXXX.



SCALE. 1 IN. RAINFALL TO 1.9 IN. VERTICALLY. H. B. T. DEL. DES. BY H. B. B.

TABLE VIII.—*Relative Amount of Ozone in the Atmosphere, by Day, during Year, and during each Month of the Year, 1882, at 20 Stations in Michigan,—as Indicated by Averages of Observations made Daily by Exposing Test-paper prepared according to Schinbain's formula, from 7 A. M. to 2 P. M.—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10) by Observers for the State Board of Health, and for the U. S. Signal Service.**

STATIONS IN MICHIGAN.*		DEGREES OF COLORATION OF TEST-PAPER—DAY OBSERVATIONS.														
(Those of U. S. Signal Service in Italics.)		Divisions of the State.*	YEAR.		MONTHS, 1882.											
			Norm. †	1882.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 20 stations. ‡				3.41	3.68	3.75	3.74	3.85	3.79	3.47	2.94	3.19	2.88	3.13	2.95	3.51
Marquette.....		U. P.	3.80	4.68	.....	3.97	3.40	2.87	2.27	2.61	2.29	2.40	2.71	2.00	2.29	
Escanaba.....		U. P.	3.08	3.22	3.39	4.71	3.61	4.20	4.58	2.33	2.74	3.45	2.43	3.19	2.43	2.77
Traverse City.....		N. W.	3.22	3.71	4.04	4.13	3.43	3.58	3.50	2.47	2.90	2.03	2.68	2.67	3.32	
Alpena.....		N. E.	3.43	4.24	4.23	5.07	4.74	4.33	4.48	4.80	3.81	4.84	4.13	3.23	3.73	3.45
Harrisville.....		N. E.	4.37	4.16	4.16	4.61	4.10	4.60	4.55	4.63	4.06	4.23	4.03	3.90	2.90	4.13
Grand Haven.....		W.	3.81	3.57	3.23	4.00	3.84	4.00	3.87	4.13	3.58	3.48	3.37	3.61	2.93	2.77
Reed City.....		W.	3.72	3.75	4.53	4.14	3.29	3.87	4.23	3.07	3.55	3.90	3.57	3.48	3.56	3.84
Port Huron.....		B. & E.	3.04	2.78	3.32	3.23	3.48	3.57	3.00	3.07	1.94	2.00	2.07	2.19	2.70	2.74
Thornville.....		B. & E.	2.69	3.23	3.68	3.79	3.55	2.73	2.48	2.87	2.32	3.13	3.07	3.45	3.45	4.29
Hastings.....		C.	3.76	4.63	4.32	4.29	3.87	4.27	3.86	2.87	2.72	2.80	3.58	3.72	4.17	.....
Lansing.....		C.	3.52	3.23	4.13	3.89	3.63	3.67	2.77	4.13	3.55	2.77	2.27	2.58	1.95	3.39
Ottisville.....		C.	3.11	3.35	3.86	3.16	3.30	3.32	3.13	2.29	2.42	2.47	3.16	3.30	3.13	.....
Winfield.....		C.	4.87	4.84	5.41	5.35	5.48	4.80	4.58	4.20	4.55	4.45	4.23	4.74	4.67	5.65
Ann Arbor.....		S. C.	2.03	2.75	1.83	1.96	3.13	3.53	3.69	2.85	2.90	3.42	2.76	2.71	1.93	2.28
Battle Creek.....		S. C.	2.90	1.77	.71	2.77	4.23	3.74	3.17	3.35	3.33	2.60	3.29	2.67	3.16	.....
Hillsdale.....		S. C.	3.04	3.35	2.95	3.13	3.29	3.26	3.16	3.15	3.00	2.67	2.61	2.83	3.03	.....
Kalamazoo.....		S. C.	2.70	3.06	3.35	3.54	3.52	4.07	3.61	3.17	2.61	2.68	2.13	2.58	2.50	2.81
Marshall.....		S. C.	3.84	3.70	3.33	3.43	3.30	4.00	4.19	4.10	4.20	4.39	4.25	3.74	2.17	3.10
Mendon.....		S. C.	2.96	3.12	3.61	3.89	3.65	3.43	3.68	2.88	2.20	2.06	2.41	2.63	3.10	3.57
Parkville.....		S. C.	4.26	4.34	5.45	4.50	4.90	4.83	5.10	4.13	2.10	2.81	3.67	3.43	4.10	4.97
Tecumseh.....		S. C.	3.57	3.39	4.32	4.50	4.61	4.30	3.74	3.53	2.57	2.65	2.57	2.55	3.17	3.94
Washington.....		S. E.	3.51	3.27	3.63	3.89	4.10	3.70	3.50	3.18	2.56	2.62	2.30	2.76	3.23	3.79

* a, b, c In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly under the numbers from which they refer to the notes below.

† For 30 days. ‡ For 20 days. § For 25 days. ¶ For 36 days. ** For 22 days.

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit II, page 122. The full names of the divisions and the counties in each division are stated in Exhibit I, page 5.

† An average for only the 20 stations for which statements are given for every month of the year, not including Marquette and Winfield.

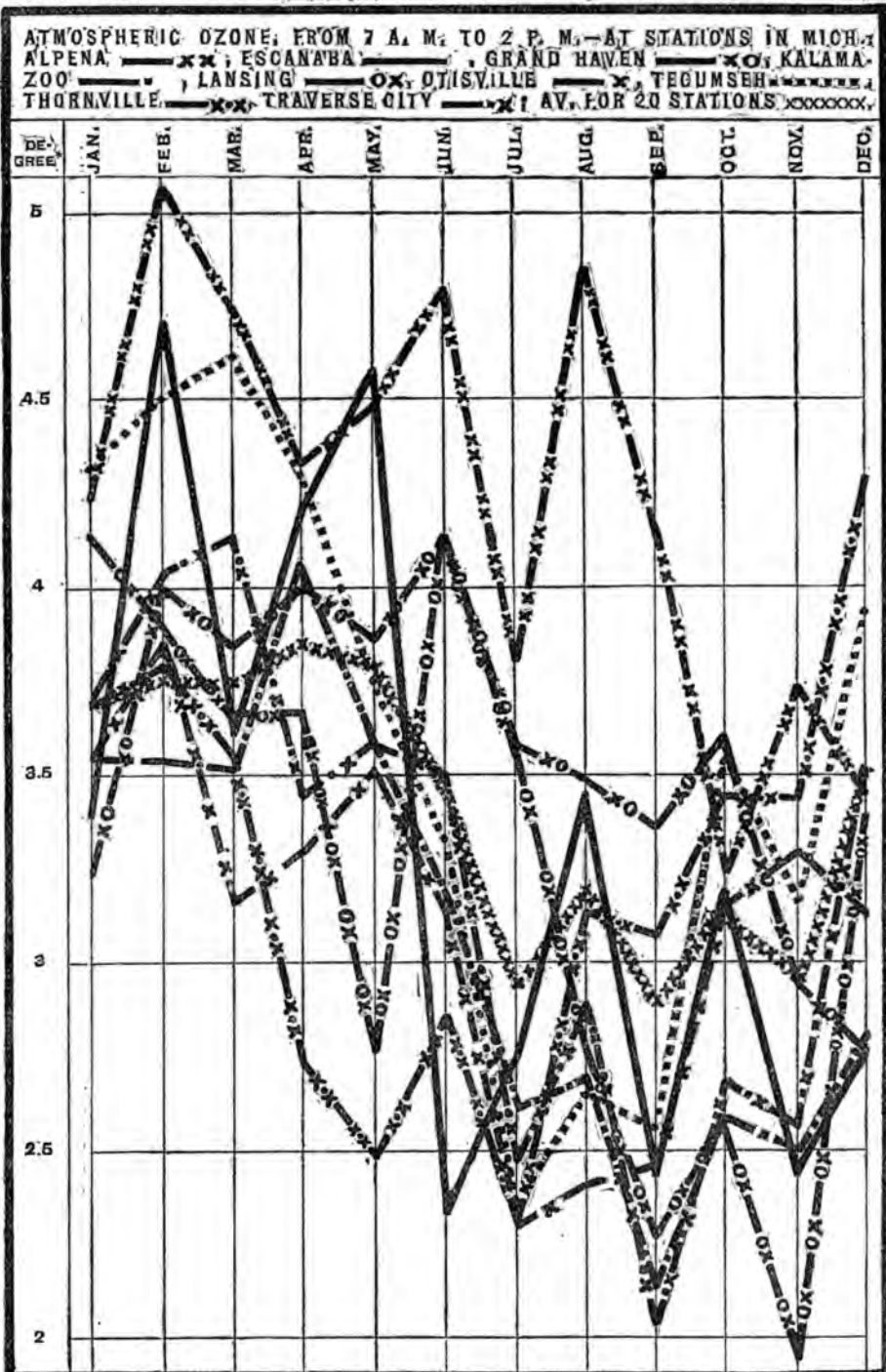
‡ Not a statement for the year, but an average for the months in 1882 represented in this line.

§ Numbers in this column state the average annual relative amount of ozone by day for periods of years ending in each case with Dec. 31, 1882. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

The computations for Ann Arbor were made and furnished by the observer at that station.

Ten lines in this table are graphically represented in Diagram VIII., page 167.

DIAGRAM VIII.—OZONE, AV. BY DAY, MONTHS IN 1882.



*SCALE, 1 DEGREE OF COLORATION (ON SCALE OF 10 DEGREES) TO 2 IN. VERTICALLY.
 H. B. T. DELL DES. BY H. H. H.

TABLE IX.—*Relative amount of Ozone in the Atmosphere at Night, during the Year, and during each Month of the Year 1882, at 20 Stations in Michigan,—as indicated by Averages of Observations made Nightly by Exposing Test-paper, prepared according to Schönbein's formula, from 9 P. M. to 7 A. M.,—Recorded according to a Scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozons equals 10), by Observers for the State Board of Health, and for the U. S. Signal Service.**

STATIONS IN MICHIGAN.* (Those of the U. S. Signal Service in Italics.)	Division of the State.*	Norm. §	DEGREES OF COLORATION OF TEST-PAPER—NIGHT OBSERVATIONS.												
			Yr., 1882.	MONTHS, 1882.											
				Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 20 sta- tions.†			3.50	4.16	4.20	4.61	3.99	3.99	3.34	2.67	2.64	2.40	2.72	3.14	4.08
			‡												
Marquette.....	U. P.	----- 2	2.99	4.90	-----	3.97	3.53	2.81	2.17	2.58	2.32	2.60	2.81	2.33	2.87
Escanaba.....	U. P.	2.75	2.96	3.06	3.57	4.77	3.03	3.45	2.20	2.55	2.87	2.53	2.71	2.13	2.65
Traverse City..	N. W.	----- 4	3.29	5.06	5.04	5.10	4.00	3.71	2.80	2.06	1.42	1.23	1.77	2.93	4.32
Alpena.....	N. E.	3.07 2	4.45	5.39	5.68	5.32	4.43	4.52	4.43	3.35	4.29	3.63	3.39	4.03	4.90
Harrisville.....	N. E.	4.53 3	4.35	4.81	4.96	4.90	4.13	4.48	4.47	4.10	4.03	4.10	3.97	4.13	4.10
Grand Haven....	W.	3.78 4	3.47	3.45	3.64	3.58	3.73	3.84	4.07	3.58	3.48	2.73	2.97	3.07	3.55
Reed City.....	W.	3.55 3	4.01	5.68	5.43	4.71	4.97	4.10	3.17	3.06	2.77	2.20	2.84	3.63	5.55
Port Huron.....	B. & E.	2.94 6	2.79	2.35	3.21	3.42	2.77	2.94	3.23	2.52	2.39	2.73	2.65	2.80	2.52
Thornville.....	B. & E.	3.15	3.79	4.35	4.89	4.90	3.70	3.48	3.23	2.35	2.58	3.17	3.32	3.90	5.58
Hastings.....	C.	----- 4	3.90	6.13	5.00	5.77	4.50	4.53 a	3.48 a	1.60 b	2.17 b	1.80	3.13	3.14 c	5.50 c
Lansing.....	C.	4.02	3.71	4.45	4.82	4.90	4.33	4.19	4.23	3.45	2.77	2.03	2.90	2.57	3.87
Otisville.....	C.	----- 2	3.87	4.74	5.18	4.84	4.63	3.94	3.57	2.81	2.61	2.40	3.32	3.43	4.97
Winfield.....	C.	3.96 3	4.53	5.45	6.00	6.24	5.05	4.82	3.92	3.47	3.26	2.38	3.34	4.32	6.11
Ann Arbor.....	S. C.	2.11	2.58	1.71	2.48 d	3.94	3.64 c	3.69 b	2.55 b	2.74	2.65	1.57 d	1.96 d	1.93 d	2.10 b
Battle Creek....	S. C.	-----	2.47	1.87	1.07	2.55	3.53	3.35	3.23	2.61 a	2.40 a	2.07	2.00	1.80	3.10
Hillsdale.....	S. C.	----- 6	3.39	3.48	4.07	3.61	3.70	3.74	3.70	3.03	3.00	2.53	3.03	3.13	3.61
Kalamazoo.....	S. C.	3.12 2	3.41	4.71	4.07	4.81	4.07	4.06	3.37	2.29	2.84	2.13	2.68	2.87	3.06
Marshall.....	S. C.	2.94 6	2.80	3.39	3.07	3.67 a	3.37	3.61	2.93	2.65	2.23 a	1.97	1.84	1.77	3.13
Mendon.....	S. C.	2.94 2	3.25	4.16	3.46	5.23	4.20	4.29	2.81 d	1.97 d	1.52 b	1.79 a	2.23 a	3.13	4.26
Parkville.....	S. C.	4.57 6	4.87	5.74	5.39	6.03	4.90	5.39	4.37	3.77	3.74	3.43	3.87	5.30	6.52
Tecumseh.....	S. C.	3.42 4	3.52	4.55	5.07	5.42	4.53	4.87	2.60 a	1.13 a	1.65	2.07	2.00	4.03	4.26
Washington.....	S. E.	3.29	3.03	4.03	3.93	4.63	3.73	3.66	2.32	1.71	1.42	1.97	1.89	3.02	4.03

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly under the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 22 days. f For 20 days.

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 11, page 122. The full names of divisions, and the counties in each division are stated in Exhibit 1, page 5.

† This line is an average for only the 18 stations for which statements, nearly complete, are given for every month of the year, not including Marquette and Winfield.

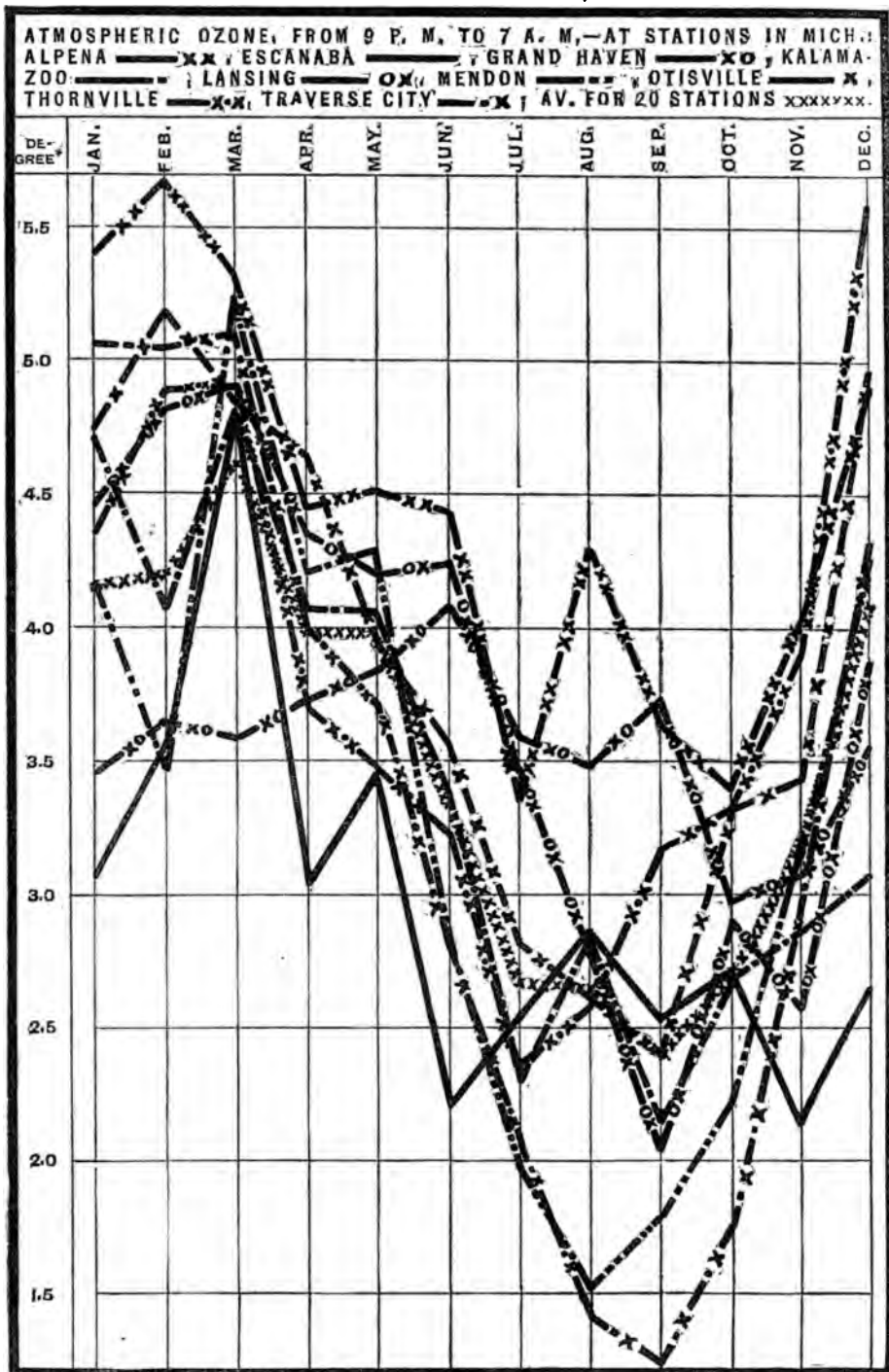
‡ Not a statement for the year, but an average for the months in 1882 represented in this line.

§ Numbers in this column state the average annual relative amount of ozone by night for periods of years ending in each case with Dec. 31, 1882. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

NOTE.—The computations at Ann Arbor were made and furnished by the observer at that station.

Ten lines in this table are graphically represented in Diagram IX, page 169.

DIAGRAM IX.—OZONE, AV. BY NIGHT, MONTHS IN 1882.



*SCALE, 1 DEGREE OF COLORATION (ON SCALE OF 10 DEGREES) TO 1.42 (IN VERTICALLY).

R. B. T. DEL.

DES. BY R. B. T.

EXHIBIT 33.—*Average Amount of Atmospheric Ozone (Day), by Year and Months, in 1882, compared with Annual and Monthly Averages for the 6 Years, 1877-82.**

YEARS, ETC.	OZONE BY DAY—DEGREES OF COLORATION OF TEST-PAPER.												
	Ann. Av.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 6 years, 1877-82.....	3.13	3.37	3.54	3.62	3.31	3.13	2.95	2.75	2.90	2.80	2.86	3.10	3.24
1877 (10 stations*)	2.21	2.63	1.83	2.47	1.68	1.68	1.97	1.84	2.40	2.21	2.35	2.81	2.62
1878 (11 stations*)	3.37	3.81	4.24	4.18	3.53	3.48	3.11	2.78	2.77	2.77	3.07	3.21	3.55
1879 (13 stations*)	2.85	3.62	3.58	3.49	3.12	2.85	2.24	2.28	2.30	2.48	2.44	2.87	2.89
1880 (17 stations*)	3.25	2.54	3.69	3.68	3.83	3.33	3.25	3.14	3.00	2.78	2.99	3.30	3.53
1881 (18 stations*)	3.68	3.94	4.12	4.16	3.82	3.63	3.63	3.51	3.74	3.66	3.18	3.43	3.32
1882 (20 stations*)	3.41	3.68	3.75	3.74	3.85	3.79	3.47	2.94	3.19	2.88	3.13	2.95	3.51
In '82 Greater than Av. 1877-82	.28	.31	.21	.12	.54	.66	.52	.19	.29	.08	.27	-----	.27
In '82 Less than Av. 1877-82.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	.15	-----

* Thornville, Kalamazoo, Mendon, and Tecumseh for the 6 years 1877-82; also Battle Creek for 5 years 1877-80, 1882; Niles for 4 years 1878-81; Nirvana for 3 years 1877-79; Coldwater for 1877, 1878, 1880; Agricultural College for 1877, 1878, 1880; Otisville for 4 years 1878-80, 1882; Alpena, Lansing, and Washington for 4 years 1879-82; Petoskey and Woodmere Cemetery for 1878, 1879; Marquette for 1880, 1881; Grand Haven and Ann Arbor for 3 years 1880-82; Fyfe Lake and Ypsilanti for 1877; Ionia and Adrian for 1880; Hudson and Mallory Lake for 1881; Escanaba, Harrisville, Reed City, Port Huron, and Marshall for 1881, 1882; Traverse City, Hastings, Hillsdale, and Parkville for 1882.

Graphic representations of statements in Exhibit 33 are given in Diagram XXI., page 171.

OZONE TESTS AS INFLUENCED BY WIND AND BY OCCUPIED BUILDINGS.

In the Report for 1882, pages 494-6, was published the results of a series of observations made during the year 1881, on one side of the State Capitol whenever the wind was blowing from that direction at the time of the beginning of the observation, and a comparison with results of regular observations made at another side of the same building; showing a considerable lessening of the evidences of the presence of ozone on that side of the building whenever it was sheltered from the wind, and towards which side the gaseous emanations were then blown. During the year 1882 more complete evidence was obtained, by making the observations at both ends of the building regularly and continuously. The results are shown in tabular form in Exhibit 35, page 174. The remarks on this subject made in last Report are all confirmed, and need not be repeated here. The greater influence of the building in the cold weather is well shown in Exhibit 35, in this Report, which also shows that the influence of the building was not manifest in the month of June from 2 to 9 P. M., notwithstanding the prevailing wind was from the S. W., at the beginning and the ending of the observations, and consequently the test-paper at the north end of the capitol was then sheltered from the wind, and would receive whatever gaseous emanations there might be at that season of the year, when coal was not being burned in the furnaces.

EXHIBIT 34.—Average Amount of Atmospheric Ozone (Night), by Year and Months, in 1882, compared with Annual and Monthly Averages for the 6 Years, 1877-1882.*

YEARS, ETC.	OZONE BY NIGHT—DEGREES OF COLORATION OF TEST-PAPER.												
	Ann. Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average 6 years 1877-82.....	3.14	3.36	4.00	4.29	3.60	3.18	2.91	2.37	2.20	2.30	2.82	3.41	3.60
1877 (10 Stat'ns*)	2.31	3.23	1.96	3.22	1.97	1.50	2.15	1.69	1.78	1.89	2.47	3.06	2.75
1878 (11 Stat'ns*)	3.43	4.13	4.38	4.49	3.88	3.68	2.88	2.40	2.22	2.57	3.26	3.36	3.95
1879 (13 Stat'ns*)	2.94	3.98	4.18	4.14	3.41	2.82	2.26	1.91	1.59	2.26	2.39	3.14	3.25
1880 (17 Stat'ns*)	3.13	3.84	4.75	4.69	4.37	3.89	3.35	2.77	2.40	1.88	3.13	3.75	4.11
1881 (18 Stat'ns*)	3.51	3.83	4.52	4.59	3.99	3.19	3.47	2.76	2.56	2.79	2.94	4.01	3.48
1882 (20 Stat'ns*)	3.50	4.16	4.20	4.61	3.99	3.99	3.34	2.67	2.64	2.40	2.72	3.14	4.06
In 1881 Greater than Av. 1877-82	.36	.30	.20	.32	.39	.81	.43	.30	.44	.10	-----	-----	.48
In 1881 Less than Av. 1877-82	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	.10	.27	-----

* The stations represented in Exhibit 34 are the same as those represented in Exhibit 33, page 170, relative to day ozone and named in the star (*) foot-note to that exhibit.

Graphic representations of statements in Exhibit 34 are given in Diagram XXII., page 173.

In the last Report it was mentioned that the tests for ozone seemed to be less interfered with at night than during the day; partly because of the lessened bleaching of the iodide of starch by the sulphurous acid formed in less quantities by night than by day, on account of fewer furnace fires, etc., at night. In that connection it should be noted that in each succeeding year the amounts of ozone according to the night observations, have been found to have very close relations to the amounts of sickness reported from several important diseases, while with the "day ozone" the relations have not been found to be so close. There is in this great encouragement for continued efforts to perfect the tests for ozone; for there is now good evidence that in the absence of sulphurous acid fumes in the atmosphere, the Schönbein test reveals the presence in the atmosphere in Michigan of *something* which is present in increased quantity nearly coincidently with the increase of certain diseases, such as bronchitis and pneumonia, and in decreased quantity nearly coincidently with the increase of other diseases as, for instance, remittent fever.

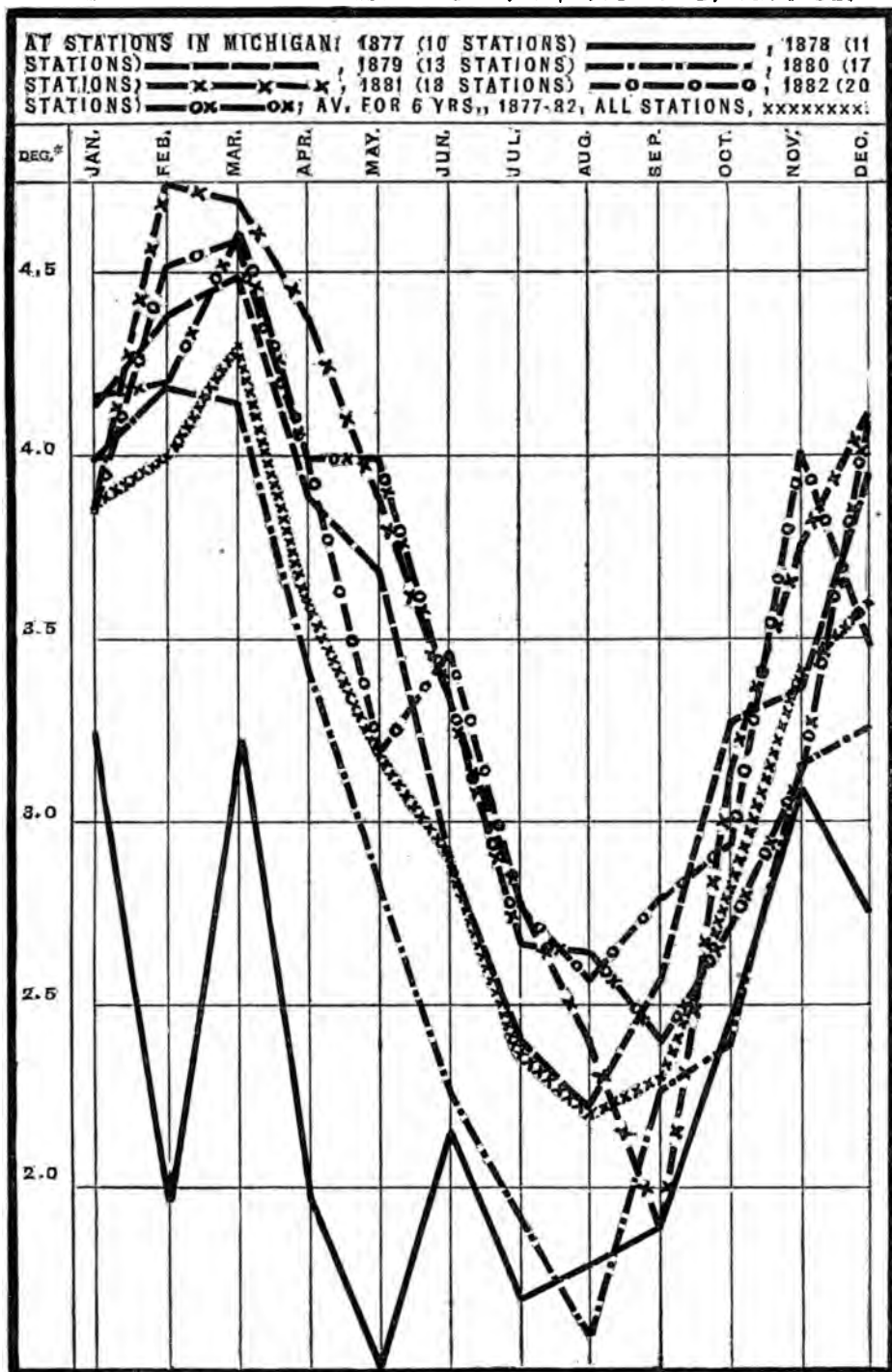
COMPARISON OF THALLIUM AND SCHÖNBEIN TESTS FOR ATMOSPHERIC OZONE.

In exhibit 36, page 175, is a comparison for the last ten months in 1882 of results of observations for ozone with iodide of potassium and starch paper prepared by Schönbein's formula, and with thallium paper. Comparisons for a full year are to be desired, and it is hoped to have them for 1883.

The thallium test-paper was prepared by Prof. J. H. Long, of the Chicago Medical College, Chicago, Ill. The Schönbein's test-paper was the same as that used by the corps of meteorological observers reporting to the Michigan State Board of Health. By both tests, by both the day and the night observations, (for the ten months in 1882 in which observations were made by both tests), the indications of the presence of ozone were comparatively slight in

[Continued on p. 175.]

DIAGRAM XXXI.—NIGHT OZONE, BY MONTHS, 1877-82.



SCALE, 1 DEGREE OF COLORATION (OR SCALE OF 10 DEGS.) TO 1.00 IN. VERTICALLY.
 H₂ BY T. DEL. DES. BY H. B. B.

EXHIBIT 35.—Comparison of special Ozone observations made on the North side of the Michigan State Capitol building, with the regular observations made at the same time at the Southwest side of the building, also the direction of the prevailing wind at times of observation. From records of observations made at the office of the State Board of Health, for the year and for months in the year 1882.

MONTHS, 1882.	BY OBSERVATIONS AT 9 P. M. TO 7 A. M.— AVERAGE DEGREE OF COLORATION.					BY OBSERVATIONS AT 7 A. M. TO 2 P. M.— AVERAGE DEGREE OF COLORATION.					BY OBSERVATIONS AT 2 P. M. TO 9 P. M.— AVERAGE DEGREE OF COLORATION.				
	At S. E. W. side of Capitol.	North end of Capitol.	Direction from which the wind blew most times at 9 P. M.	Direction from which the wind blew most times at 7 A. M.	Greater (+) or less (-) at north end than at S. W. side.	At S. E. W. side of Capitol.	North end of Capitol.	Direction from which the wind blew most times	Direction from which the wind blew most times at 7 A. M.	Greater (+) or less (-) at north end than at S. W. side.	At S. E. W. side of Capitol.	North end of Capitol.	Direction from which the wind blew most times	Direction from which the wind blew most times at 9 P. M.	Greater (+) or less (-) at north end than at S. W. side.
Av. Year.....	3.71	3.32	S. W.	S. W.	-0.39	3.23	3.05	S. W.	S. W.	-0.18	3.03	2.78	S. W.	S. W.	-0.25
January.....	4.45	2.45	S. W.	S. W.	-2.00	4.13	2.45	S. W.	S. W.	-1.03	3.65	2.10	W.	S. W.	-1.55
February.....	4.82	3.79	S. W.	S. W.	-1.03	3.89	2.54	S. W.	S. W.	-1.35	4.07	3.04	S. W.	S. W.	-1.03
March.....	4.90	4.84	N. W.	N. W.	-0.06	3.65	3.43	N. W.	N. W.	-0.23	3.84	3.55	N. W.	N. W.	-0.29
April.....	4.83	4.59	N. E.	N. E.	+0.26	3.67	4.11	N. E.	N. E.	+0.44	3.33	3.76	N.	N. E.	+0.43
May.....	4.19	4.97	N. E.	N. E.	+0.78	2.77	3.74	N. E.	N. E.	+0.97	3.16	4.26	N. E.	N. E.	+1.10
June.....	4.23	4.13	S. W.	S. E.	-0.10	4.13	4.17	S. E.	S. E.	+0.04	3.77	3.77	S. W.	S. W.	=
July.....	3.45	3.23	S. W.	S. W.	-0.22	3.55	3.77	S. W.	S. W.	+0.22	3.10	3.03	S. W.	S. W.	-0.07
August.....	2.77	2.90	S. W.	S. W., N. E.	+0.13	2.77	3.26	S. W., S. E.	S. E.	+0.49	2.58	2.77	S. E.	S. W.	+0.19
September.....	2.03	2.07	N. E.	N. E., S. W.	+0.04	2.27	2.87	S. W.	N. E.	+0.60	1.90	2.03	N. E.	N. E.	+0.13
October.....	2.90	2.19	S.	S.	-0.71	2.58	2.48	S.	W.	-0.10	2.16	2.00	W.	S.	-0.16
November.....	2.67	2.17	S. E.	S. W.	-0.40	1.93	1.80	S. W., S., S. E.	S. W.	-0.13	1.70	1.33	S. W.	S. E.	-0.37
December.....	3.87	2.48	S. W.	W.	-1.39	3.39	2.00	W.	W.	-1.39	3.13	1.77	W.	S. W.	-1.36

EXHIBIT 36.—*Comparison of results of Observations for Ozone by means of Thallium Test-paper, with results of Observations by means of Test-paper prepared by Schönbein's Formula. Monthly Averages for 10 Months in 1882, at the Office of the State Board of Health, Lansing, Mich.*

MONTHS, 1882.	AVERAGE DEGREE OF COLORATION.*								
	OBSERVATIONS FROM 9 P. M. TO 7 A. M.			OBSERVATIONS FROM 7 A. M. TO 2 P. M.			OBSERVATIONS FROM 2 P. M. TO 9 P. M.		
	With Schönbein's Test-paper.	With Thallium Test-paper.	Greater (+) or less (-) with Thallium than by Schönbein's Test-paper.	With Schönbein's Test-paper.	With Thallium Test-paper.	Greater (+) or less (-) with Thallium than by Schönbein's Test-paper.	With Schönbein's Test-paper.	With Thallium Test-paper.	Greater (+) or less (-) with Thallium than by Schönbein's Test-paper.
Av. 10 Months.....	3.52	1.77	-1.75	3.07	1.63	-1.44	2.87	1.73	-1.14
March.....	4.90	2.66	-2.24	3.65	1.92	-1.73	3.84	1.95	-1.89
April.....	4.33	2.40	-1.93	3.67	2.17	-1.50	3.33	1.75	-1.58
May.....	4.19	1.79	-2.40	2.77	1.61	-1.16	3.16	1.50	-1.66
June.....	4.23	1.83	-2.40	4.13	1.93	-2.20	3.77	2.45	-1.32
July.....	3.45	1.73	-1.72	3.55	1.94	-1.61	3.10	2.11	-0.99
August.....	2.77	1.26	-1.51	2.77	1.42	-1.35	2.58	1.84	-0.74
September.....	2.03	0.57	-1.46	2.27	1.30	-0.97	1.90	1.37	-0.53
October.....	2.90	1.11	-1.79	2.58	1.29	-1.29	2.16	1.23	-0.93
November.....	2.57	1.63	-0.94	1.93	0.77	-1.16	1.70	1.10	-0.60
December.....	3.84	2.71	-1.13	3.39	1.94	-1.45	3.13	2.03	-1.10

* By a scale of 10 degrees of coloration,—Maximum = 10.

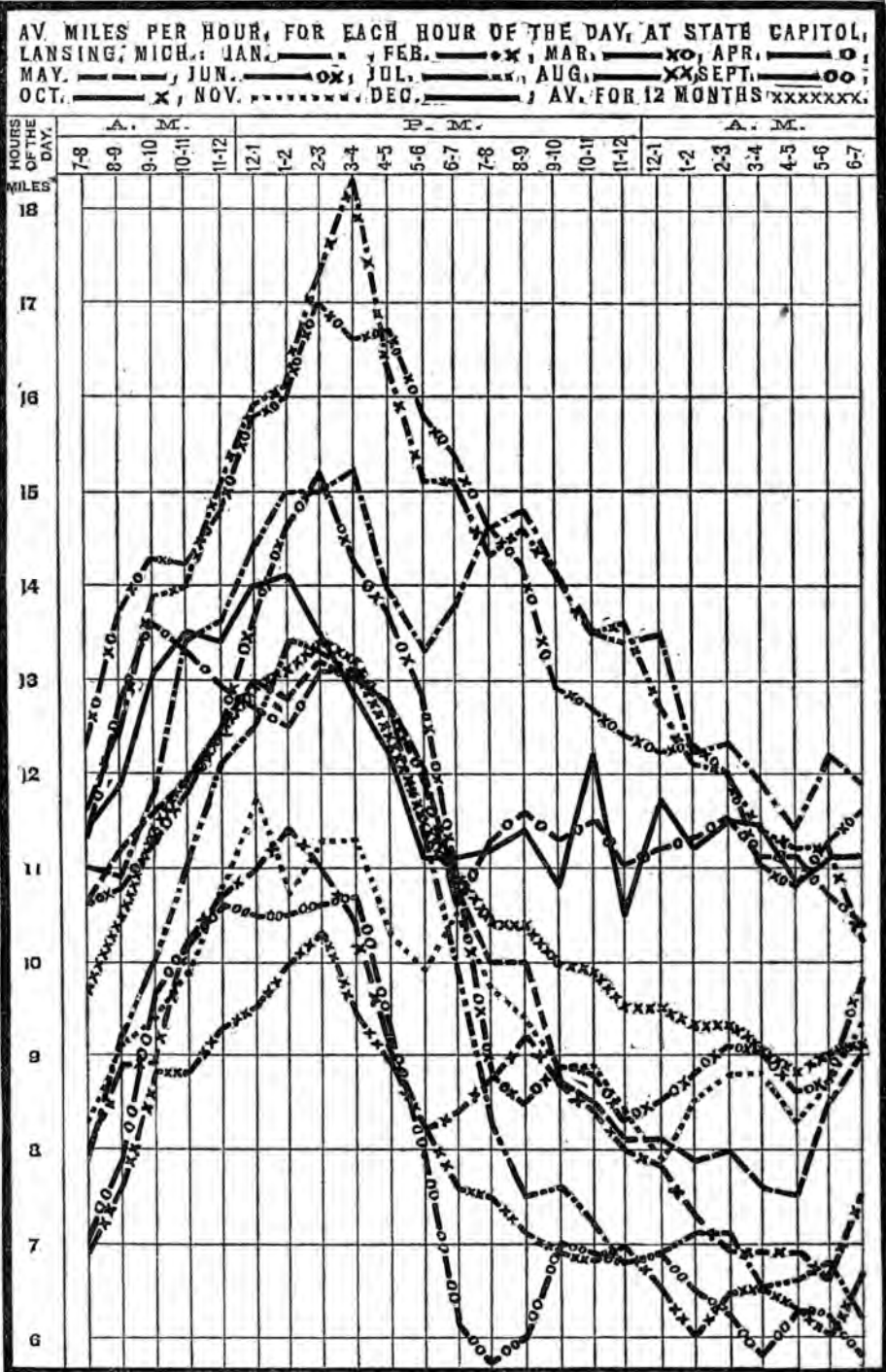
[Continued from page 172.]

September and November. By the thallium test comparatively great indications were obtained in December, March, April, and June; by the iodide of potassium and starch test (Schönbein's) the greatest indications were obtained in March, April, and June.

It will be seen that, although there are a few exceptions, the differences between the results by the two tests were generally least when the indications of the presence of ozone were least, and greatest when the indications of the presence of ozone were greatest. It appears that the difference in results by the two tests was generally greater by the night than by the day observations. This may in part be explained by the fact that the test-paper was exposed three hours longer at the night than at the day observations.

From the evidence here given, and the further fact that the thallium test-paper has seldom if ever been found colored near the maximum of the scale, it would appear that the thallium test-paper should if possible be made more sensitive. Perhaps this may be done by employing more thallium to the same quantity of paper. If the test-paper cannot be made more sensitive, perhaps the scale can be amended by leaving out the darker shades and dividing and spreading out those remaining to make a scale of ten degrees, which will enable one more accurately to record the actual meteorological experiences with this test upon this subject.

DIAGRAM X.—VELOCITY OF WIND, BY HOURS AND MONTHS, 1882.



* SCALE, ONE MILE PER HOUR TO .5 IN. VERTICALLY.
H. B. T. DEL. DES. BY H. B. B.

TABLE X.—Average velocity of the Wind, in Miles per Hour, for each Hour of the Day, by Months of the Year 1882.—Compiled from Registers of the Robinson's Self-Registering Anemometer, above the roof of the Capitol, and in the office of the State Board of Health, Lansing, Michigan.

MONTHS.	AVERAGE.		HOURS (1882), AND AVERAGE MILES PER HOUR.																							
	1880.	1881.	A. M.						P. M.						A. M.											
	—	—	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7
Year.	9.4	9.6	9.9	10.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Jan.	11.0	7.3	10.5	13.2	11.0	10.9	11.8	13.4	13.6	14.4	15.0	15.2	14.0	13.3	13.8	14.6	14.8	14.1	13.5	13.4	13.5	12.2	12.3	11.9	11.4	12.2
Feb.	12.6	11.0	12.5	13.8	11.6	12.5	13.9	14.0	15.0	15.9	16.1	17.3	18.3	16.3	15.1	14.3	14.6	14.1	13.5	13.6	12.7	12.1	12.0	11.4	11.2	10.2
March	12.8	10.4	12.3	13.8	12.3	13.7	14.3	14.2	14.8	15.8	16.9	17.0	16.6	15.7	15.8	15.4	14.2	12.9	12.7	12.4	12.2	12.3	12.0	11.0	10.8	11.3
April.	13.8	9.8	11.8	11.8	11.3	12.7	13.6	13.3	12.9	12.7	12.5	13.1	12.7	11.9	10.6	11.3	11.6	11.3	11.5	11.0	11.2	11.3	11.5	11.1	11.1	10.7
May.	10.4	8.4	9.7	10.3	10.6	11.2	11.6	11.9	12.5	13.0	12.8	13.0	12.8	12.0	10.8	10.0	10.0	8.7	8.5	8.1	8.1	7.9	8.0	7.6	7.5	8.5
June.	8.3	8.4	9.1	10.7	10.6	10.8	11.3	11.8	12.5	13.7	14.6	15.2	14.2	13.7	12.8	11.0	8.8	8.5	8.9	8.8	8.5	8.8	9.1	9.0	8.6	8.7
July.	6.5	8.1	7.9	9.2	7.9	9.2	10.0	11.1	12.1	12.5	13.4	13.3	13.1	12.7	11.3	9.9	8.3	7.5	7.2	6.8	6.9	7.1	7.1	6.5	6.6	6.8
Aug.	5.9	7.0	6.9	7.7	6.9	7.6	8.8	8.8	9.3	9.5	10.0	10.3	9.4	8.9	8.2	7.6	7.5	7.1	6.9	6.8	7.0	6.5	6.5	6.3	6.0	6.7
Sept.	8.1	10.3	8.7	7.8	7.0	7.9	9.7	10.2	10.6	10.5	10.5	10.6	10.7	9.2	7.9	6.1	5.7	6.0	6.9	6.8	6.9	6.5	6.2	5.8	6.3	6.2
Oct.	7.8	8.7	8.4	8.7	8.0	8.9	8.9	10.2	10.7	11.0	11.4	11.0	10.4	9.1	8.2	8.4	8.8	9.2	8.7	8.4	7.8	7.3	6.9	6.9	6.9	6.6
Nov.	8.6	14.6	10.8	9.1	8.3	9.1	9.4	9.9	10.8	11.7	10.7	11.3	11.3	10.3	9.9	10.5	9.7	9.4	8.9	8.4	7.9	8.5	8.8	8.3	8.7	9.3
Dec.	7.4	11.2	10.2	11.9	11.4	11.9	13.1	13.5	13.4	14.0	14.1	13.5	12.8	12.2	11.1	11.1	11.2	11.4	10.8	12.2	10.5	11.7	11.2	11.3	10.8	11.1

The statements in the fourth figure-column in Table X. of the average velocity of the wind in miles per hour, by months, during the year 1882, are graphically represented in Diagrams XI. and XXIII., pages 181 and 179; the remaining columns of Table X. for 1882 are graphically represented in Diagram X., opposite this page.

EXHIBIT 37.—*Average Velocity of the Wind in Miles per Hour, by Months, for each Year and for the 3 Years 1880-82. From Registers of the Robinson's Self-Registering Anemometer in the Office of the State Board of Health, State Capitol, Lansing, Michigan.*

YEARS, ETC.	Ann- ual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 3 yrs., 1880-82.....	9.9	10.5	12.5	12.3	11.8	9.7	9.1	7.9	6.9	8.7	8.4	10.8	10.2
1880.....	9.5	11.0	12.6	12.8	13.8	10.4	8.3	6.5	5.9	8.1	7.8	8.6	7.4
1881.....	9.6	7.3	11.0	10.4	9.8	8.4	8.4	8.1	7.0	10.3	8.7	14.6	11.2
1882.....	10.7	13.2	13.8	13.8	11.8	10.3	10.7	9.2	7.7	7.8	8.7	9.1	11.9
In 1882 Great- er than Av. 1880-82.....	.8	2.7	1.3	1.5	0	.6	1.6	1.3	.8	-----	.3	-----	1.7
In 1882 Less than Av. 1880- 82.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	.9	-----	1.7	-----

Graphic representations of statements in the first four lines of Exhibit 37 are given in Diagram XXIII., page 179.

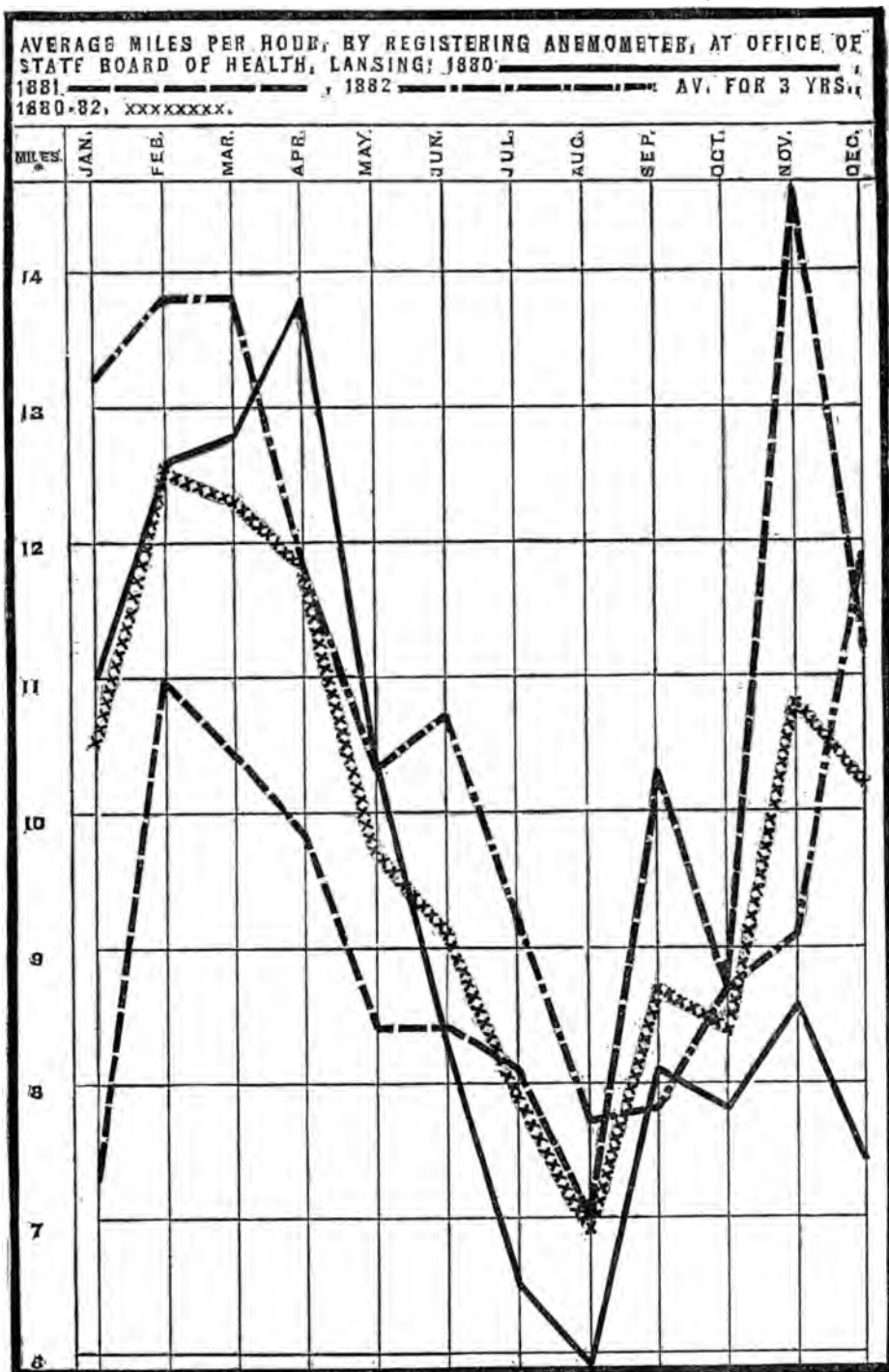
[Remarks on ozone continued from page 175.]

GUAICUM TEST-PAPER FOR OZONE.

During the first six months of the year 1882, regular tri-daily observations were made at the State Capitol with guaicum test-paper, prepared by Prof. J. H. Long, M. D., of Chicago, who was acting for a committee of the American Medical Association. Some results of those observations, and comparisons with results of observations by means of the Schönbein test-paper, are stated in Exhibit 36½, page 180. It will be seen that the coloration of the guaicum paper was very much less during the night than during the day, and less by the afternoon exposure than by that from 7 A. M. to 2 P. M.; probably because of the influence of sunlight in causing the coloration. After the close of the series of observations, it was noticed that in the quality of the test-paper used there was an abrupt change March 4, the paper used before that date being either heavier paper or more stiffened by a larger quantity of the guaicum. This makes it desirable that another series of observations be made before making a comparison by months.

[Continued in Exhibit 36½, at foot of page 180.]

DIAGRAM XXIII:--VELOCITY OF WIND, BY MONTHS, 1880-82.



* SCALE, VELOCITY OF ONE MILE PER HOUR TO 1/3 IN. VERTICALLY.
H.B.T. DEL. DES. BY B.B.B.

TABLE XI.—Average Velocity of the Wind in Miles per Hour for each Month of the Year 1882, at 7 Stations in Michigan. Computed from Registers of the Robinson's Self Registering Anemometer,* by Observers for the State Board of Health and for the U. S. Signal Service.

STATIONS IN MICHIGAN.†	Division of the State.	MILES, BY SELF-REGISTERING ANEMOMETERS.												
		YEAR, 1882.	MONTHS IN 1882.											
			Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 Stations----	-----	9.6	11.5	11.7	11.8	11.1	10.1	8.7	8.5	6.9	7.5	8.6	8.6	10.1
Marquette..	U. P.	8.7	10.9	10.8	10.3	9.6	8.3	6.8	8.1	5.9	6.3	9.2	8.1	10.1
Escanaba....	U. P.	8.5	8.5	9.3	9.5	10.5	9.8	7.6	7.8	7.4	7.8	9.2	6.2	8.2
Alpena.....	N. E.	9.9	10.6	12.0	13.2	10.4	10.2	9.1	8.7	7.9	8.4	9.4	9.1	9.8
G'd Haven..	W.	11.3	13.8	14.1	13.7	13.3	11.4	9.9	10.0	8.3	8.5	10.0	10.6	11.8
Port Huron.	B. & E.	8.7	11.0	10.6	10.2	11.1	10.7	7.3	7.6	4.9	6.9	7.3	8.1	8.9
Lansing.....	C.	10.7	13.2	13.8	13.8	11.8	10.3	10.7	9.2	7.7	7.8	8.7	9.1	11.9
Ann Arbor.*	S. C.	9.2	12.2	11.5	12.2	11.0	9.6	8.7	7.4	6.1	6.7	6.5	8.0	10.0
Detroit.....	S. E.	9.9	11.5	11.7	11.8	11.2	10.7	9.7	8.8	7.3	7.9	8.1	9.9	10.4

* Gibbon's Anemometer was used at Ann Arbor.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 11, page 122.

Graphic representations of statements made in Table XI. are given in Diagram XI., page 181.

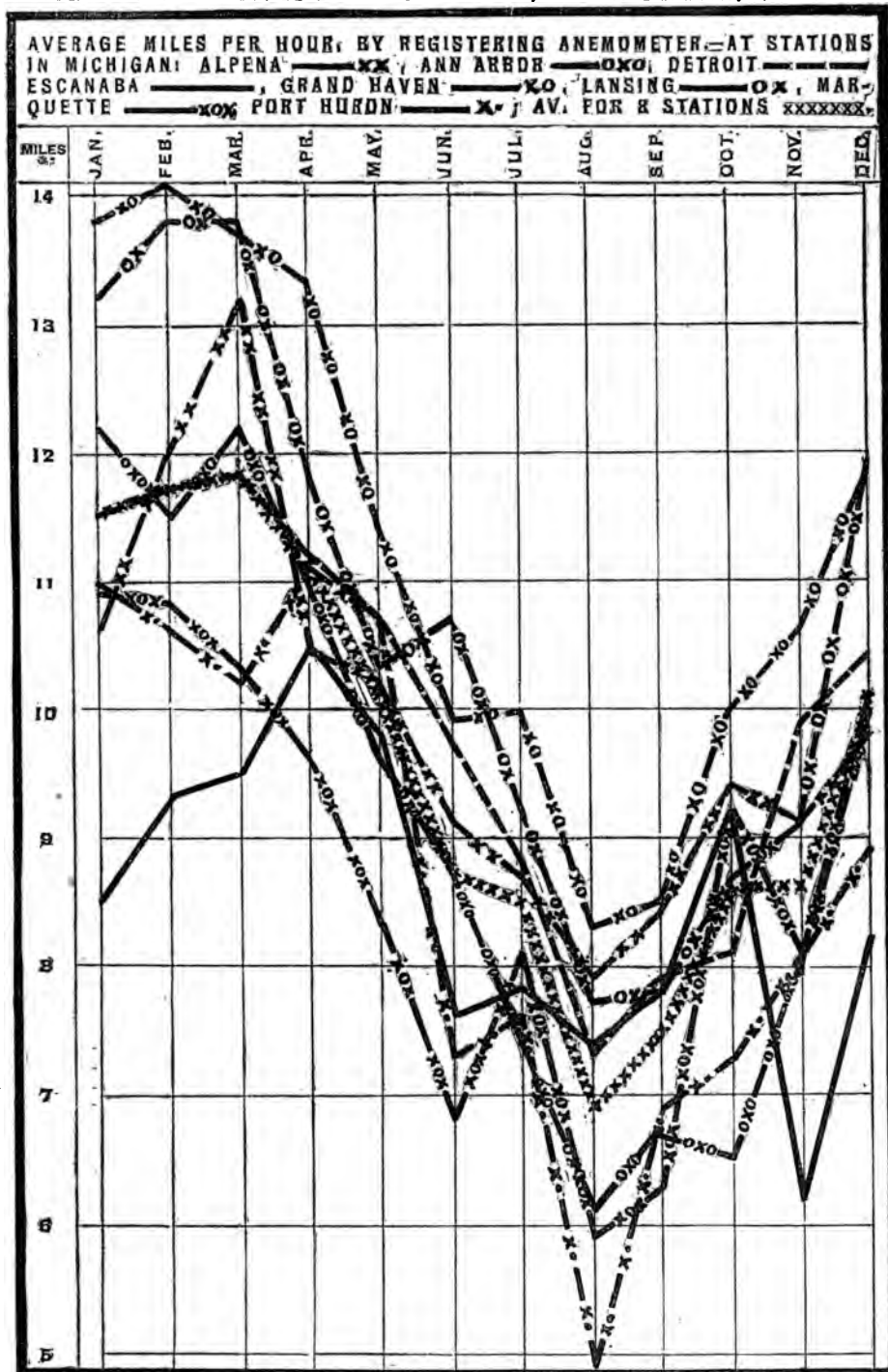
EXHIBIT 36½.—Comparison of results of Observations for Ozone by means of Guaiacum Test-paper, with results of Observations by means of Test-paper prepared by Schönbein's Formula. Monthly Averages for 6 Months in 1882, at the Office of the State Board of Health, Lansing, Mich.

MONTHS, 1882.	AVERAGE DEGREE OF COLORATION OF TEST-PAPER.*								
	OBSERVATIONS FROM 9 P. M. TO 7 A. M.			OBSERVATIONS FROM 7 A. M. TO 2 P. M.			OBSERVATIONS FROM 2 P. M. TO 9 P. M.		
	Schönbein's.	Guaiacum.	Guaiacum less than Schönbein's.	Schönbein's.	Guaiacum.	Guaiacum less than Schönbein's.	Schönbein's.	Guaiacum.	Guaiacum less than Schönbein's.
Av. 6 Months.....	4.49	0.43	4.06	3.71	2.54	1.17	3.64	1.67	1.97
January.....	4.45	† 0.48	3.97	4.13	2.68	1.45	3.65	1.63	2.02
February.....	4.82	0.54	4.28	3.89	3.61	.28	4.07	2.11	1.96
March.....	4.90	0.21	4.69	3.65	1.82	1.83	3.84	0.89	2.95
April.....	4.33	0.13	4.20	3.67	1.27	2.40	3.33	0.93	2.40
May.....	4.19	0.52	3.67	2.77	2.06	.71	3.16	1.37	1.79
June.....	4.23	0.67	3.56	4.13	3.77	.36	3.77	3.10	.67

* By a scale of 10 degrees of coloration,—Maximum = 10.
Comments on Exhibit 36½ are printed at foot of page 178.

† For 79 observations.

DIAGRAM XI.—VELOCITY OF WIND, BY MONTHS, IN 1882.



SCALE, ONE MILE PER HOUR TO .69 IN VERTICALLY.

B. B. T. DEL.

DES. BY B. B. T.

TABLE XII.—*Number of Observations per Month (at 7 A. M., 2 P. M., and 9 P. M.,* daily), at which the Wind was Blowing from each of the Eight Principal Points of Compass, during the Year and during each month of the Year 1882,—Average for 21 Stations in Michigan.†*

POINTS OF COMPASS.	AVERAGE NUMBER OF OBSERVATIONS PER MONTH, 1882.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
All observat'ns	91	93	84	93	90	93	90	93	93	90	93	90	93
Calm.....	6	4	4	3	3	5	7	9	9	9	9	7	5
North.....	7	4	3	7	12	11	7	8	8	7	5	5	3
Northeast.....	9	4	4	7	16	24	9	5	12	14	9	10	2
East.....	7	4	4	10	9	10	8	3	10	10	7	6	5
Southeast.....	10	11	11	13	6	9	10	5	11	9	13	13	12
South.....	9	12	13	7	5	7	8	10	8	7	15	10	9
Southwest.....	16	20	20	12	8	11	15	21	15	13	15	16	22
West.....	14	21	16	14	13	9	15	18	9	10	11	13	22
Northwest.....	12	13	9	20	18	11	10	14	11	10	9	10	12

* At stations of the U. S. Signal Service the observations were made at 7 A. M., 3 P. M., and 11 P. M., Washington mean time.

† The names of observers, their places of observation, and the counties and divisions of the State in which those places are situated are stated in Exhibit 11, page 122.

Graphic representations of statements in Table XII. are given in Diagram XIII., page 183.

EXHIBIT 38½.—*DIRECTION OF WIND, 1878-82.—Number of Observations per Month (at 7 A. M., 2 P. M., and 9 P. M.,* Daily), at which the Wind was Blowing from the several (eight) Points of Compass.—Annual and Monthly Averages for the Five Years 1878-82, at Stations in Michigan.†*

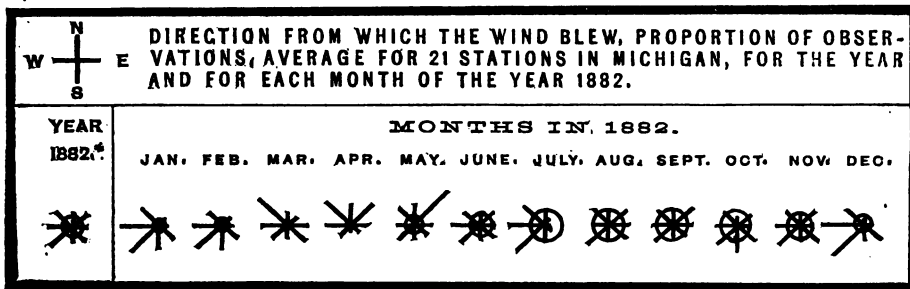
POINTS OF COMPASS.	AVERAGE NUMBER OF OBSERVATIONS PER MONTH,—5 YEARS 1878-82.												
	Annua- l Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observ'ns..	91	93	85	92	90	93	90	93	93	90	93	90	93
Calm.....	5	4	4	3	3	5	5	7	8	7	6	4	3
North.....	7	5	6	9	9	7	7	8	8	5	5	4	5
Northeast.....	8	6	8	8	11	12	10	8	11	7	6	5	6
East.....	6	5	5	8	8	8	6	5	7	5	4	4	5
Southeast.....	9	9	9	10	8	10	9	6	9	9	10	9	7
South.....	10	12	10	7	7	10	10	9	9	13	15	11	9
Southwest.....	18	22	16	12	13	17	15	19	18	19	20	19	24
West.....	15	16	13	16	12	13	14	17	12	14	14	19	21
Northwest.....	14	14	13	20	18	12	12	13	12	12	13	13	13

* At stations of the U. S. Signal Service after June 30, 1881, the observations were made at 7 A. M., 3 P. M., and 11 P. M., Washington mean time.

† At 12 stations in 1878; 16 in 1879; 19 in 1880; 19 in 1881; and 21 in 1882.

By Table XII., above, or Diagram XIII., page 183, it appears that the prevailing winds in Michigan in May, 1882, were from the northeast, and that the proportion of northeast winds (at 24 of 93 tri-daily observations, on an

DIAGRAM XIII.—WIND, DIRECTION, IN MICH., YEAR AND MONTHS, 1882.



*SCALE, RADIUS OF ONE INCH TO ONE OBSERVATION.
H. H. T. DEL. DEC. BY H. H. H.

Explanations of the construction and manner of reading Diagrams XII., XIII., and XIV. are given on page 185. For convenient study, the top of each of these diagrams should be held toward the north. The scale is such that each one-hundredth of an inch of the converging lines represents one observation of wind blowing in the direction indicated by the line, toward the centers of the small figures. The number of calms observed is indicated by the length of the radius of each circle, each one-hundredth of an inch indicating one observation of a calm. Exact numerical statements corresponding to these diagrams are given in Tables XII., XIII., and XIV.

average for the 21 stations represented) was very great. In no other month of 1882 was the wind in one direction at 24 observations, on an average for these 21 stations. A comparison of this table with similar tables for the four years 1878–81 (on pages 380 of the Report for 1879, 354 of the Report for 1880, 458 of the Report for 1881, and 504 of the Report for 1882) shows that in none of these years was there so great a prevalence (actual or relative) of northeast winds in May as in May 1882. A comparison with Exhibit 38½, page 182, shows that northeast winds were twice as prevalent in May, 1882, as the average for the five years 1878–82, and also that they were considerably more prevalent in April than the average for those years. In connection with this should be noted the fact that the temperature in May, 1882, was unusually low, as is shown in Exhibits 15, 16, and 17, pages 130 and 132. Exhibits 15 and 17 indicate that the temperature in April, 1882, was somewhat below the norm. It also appears by these exhibits that the mean temperature in February, 1882, was very much above the average February temperature for a period of years; also that in January it was somewhat above the average, and that in November and December, 1881, it was considerably above the average.

Observations made since 1845 by Mr. Thorlacius, at Stykkisholm, Iceland, for the Scottish Meteorological Society, show that for the five months ending March, 1882, in Iceland the atmospheric pressure was much lower than usual, the temperature higher than usual, and that there was an unusual prevalence of south-west and south winds. About the middle of March, 1882, there was a great change. The mean atmospheric pressure became higher, the temperature lower (for the season), there was but little south or southwest wind, and there was a series of violent north-east storms which broke up the Arctic ice to the north and northeast, and drove it south against the north and east shores of the island. Even till the first of July the north and east coasts were blockaded to navigation by the immense ice floes. This caused a season of very great severity, the like of which was not remembered. Vegetation was so much retarded as to cause great loss of cattle, horses, sheep, and other animals, and great suffering to man. In the west Atlantic, too, an unusual number of icebergs was noticed by vessels crossing the ocean. That

there was a close relation of the unusual prevalence of northeast winds, and the unusually low temperature in Michigan in the spring of 1882, especially noticeable in May, with the northeast winds and the unusual quantity of floating ice in the north and west Atlantic, seems probable. The warm winter and the subsequent cold spring of 1882 were especially marked in Great Britain also; and the relation of these to the coincident conditions observed in Iceland were well pointed out by E. Douglas Archibald, in *Nature* for June 29, 1882, vol. 26, pages 197-8.

TABLE XIII.—Average Number of Observations per Month for the Year 1882, at which the Wind was Blowing from each of the Eight Principal Points of Compass, at each of 21 Stations in Michigan; also the Average for all said Stations.*

STATIONS IN MICHIGAN.* (Those of the U. S. Signal Service in Italics.)	Divisions of the State.†	AVERAGE NUMBER OF OBSERVATIONS PER MONTH IN 1882.									
		All Obs.	Calm	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Av. for 21 Stations‡.....		91	6	7	9	7	10	9	16	14	12
<i>Marquette</i>	U. P.	91	3	11	7	6	8	10	11	15	20
<i>Escanaba</i>	U. P.	91	8	19	7	5	10	15	7	9	13
Traverse City.....	N. W.	91	8	16	8	3	8	14	21	5	10
<i>Alpena</i>	N. E.	91	1	6	3	11	16	8	9	20	17
Harrieville.....	N. E.	91	0	7	7	7	8	19	12	24	8
<i>Grand Haven</i>	W.	91	1	5	14	13	8	14	13	13	11
Reed City.....	W.	91	0	6	6	4	22	8	20	8	17
<i>Port Huron</i>	B. & E.	91	6	10	14	5	6	17	14	12	8
Thornville.....	B. & E.	91	6	1	12	2	10	1	14	17	29
Agricultural College.....	C.	91	20	5	7	8	7	6	19	12	6
Hastings.....	C.	90	9	4	7	13	14	7	9	16	9
Lansing.....	C.	91	1	5	13	6	13	8	20	15	11
Otisville.....	C.	91	0	4	11	11	13	6	18	20	9
Winfield.....	C.	87	2	3	10	8	14	9	27	6	8
Ann Arbor.....	S. C.	91	1	7	8	9	12	11	16	16	12
Battle Creek.....	S. C.	90	1	6	7	13	10	8	11	23	11
Hillsdale.....	S. C.	91	0	6	10	4	11	8	13	20	20
Kalamazoo.....	S. C.	91	0	5	13	4	8	10	30	9	12
Marshall.....	S. C.	91	15	2	11	8	10	5	22	12	7
Mendon.....	S. C.	89	0	6	14	6	7	9	23	12	10
Parkville.....	S. C.	91	11	2	7	12	11	8	20	11	10
Tecumseh.....	S. C.	91	21	4	7	10	4	6	17	16	7
<i>Detroit</i>	S. E.	91	2	8	9	11	8	13	13	17	10
Washington.....	S. E.	91	19	6	13	3	10	5	11	13	13

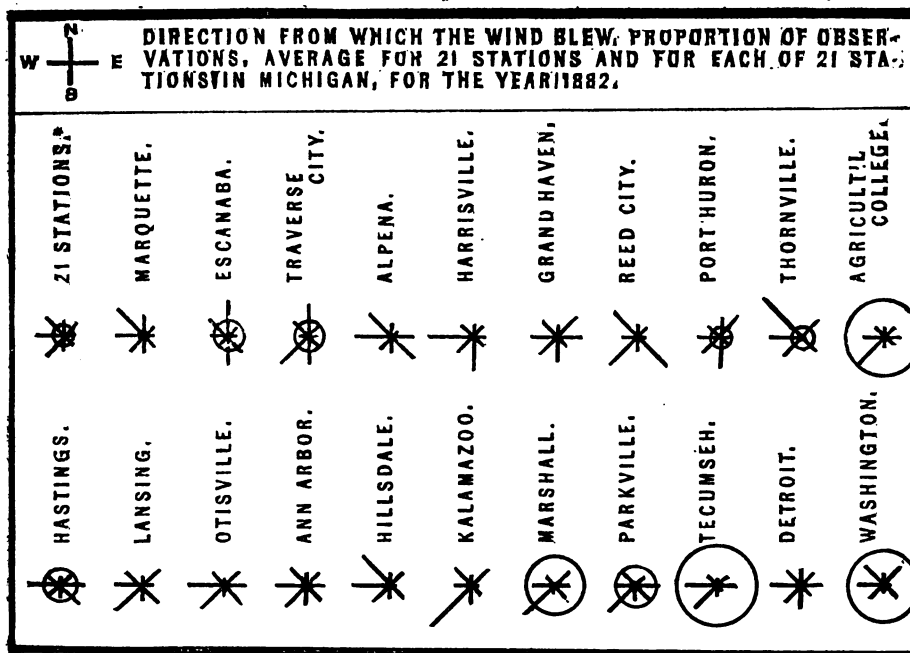
* The names of observers, their places of observation, and the counties and divisions of the State, in which these places are situated, are stated in Exhibit 11, page 122.

† The full names of the divisions, and the counties in each division, are stated in Exhibit 1, p. 5.

‡ This line is an average for only the stations for which statements, nearly complete, are given for every month of the year. It does not include Winfield, Battle Creek, nor Mendon.

Graphic representations of statements in Table XIII. are given in Diagram XIV., page 185.

DIAGRAM XIV.—WIND, DIRECTION, AT STATIONS IN MICHIGAN, 1882.



H. B. T. DEL.

DES. BY H. B. B.

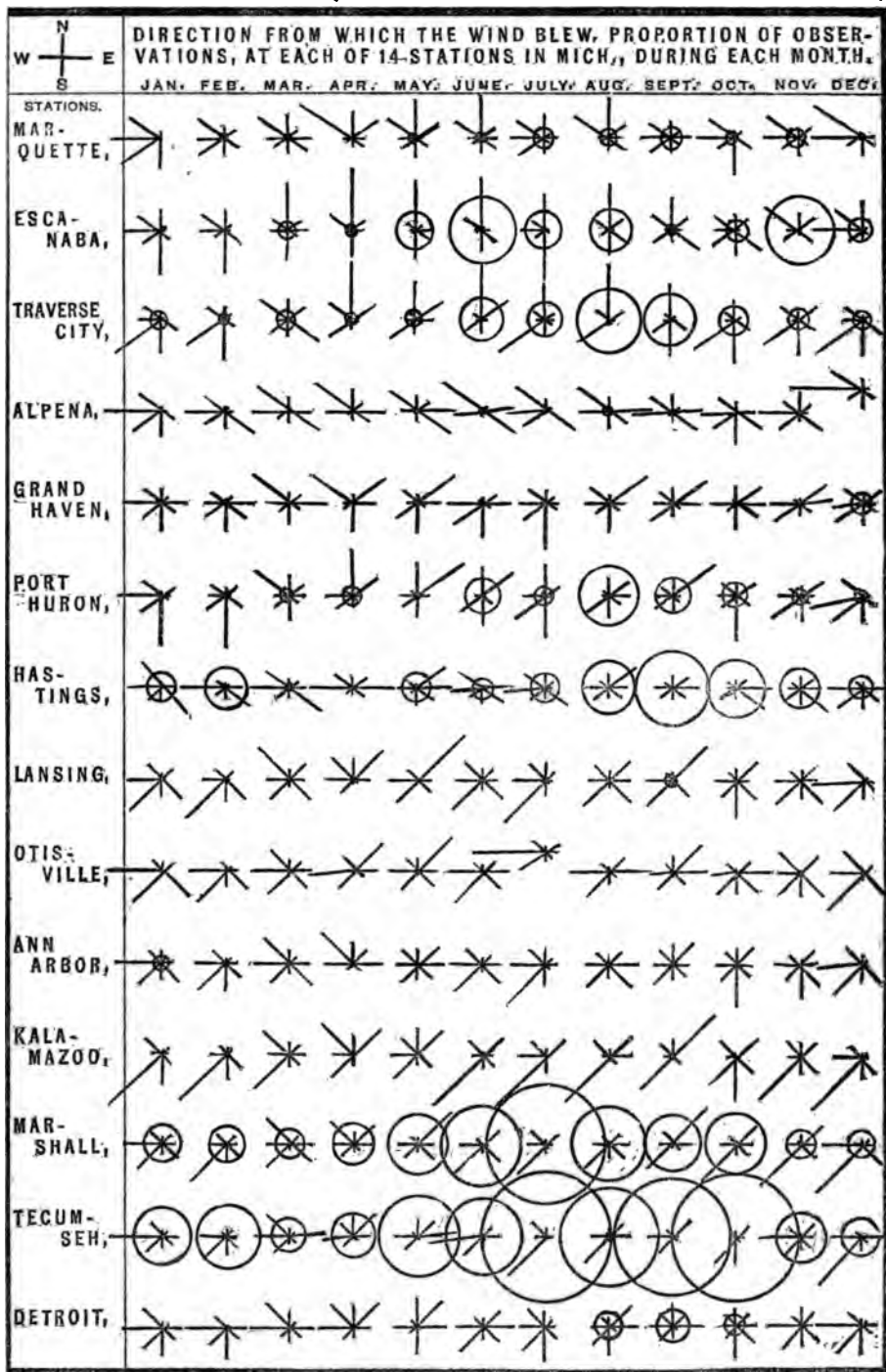
*SCALE; RADIUS .01 OF ONE INCH TO ONE OBSERVATION. NUMERICAL STATEMENTS CORRESPONDING TO LINES IN THIS DIAGRAM ARE GIVEN IN TABLE XII, PAGE 184.

The construction and purport of the diagrams relating to direction of wind may be explained as follows:

In diagrams XII., XIII., and XIV., pages 183, 185, 186, relating to direction of the wind, the single figures or separate groups of lines are designed to indicate by the length of the lines the number and the proportion of regular observations at 7 A. M., 2 P. M., and 9 P. M.,* daily, at which the wind was blowing from each of the eight principal points of compass at the places and for the periods of time stated in the margin; and by the direction of the lines on the page, the direction of the wind. Each figure consists of lines drawn to a common center from some or all of the following directions on the page, and indicating that at the times of observation the wind blew from points of the compass as follows: Lines toward the common center from the top of the page indicate observations that the wind was blowing from the north; from the right-hand side, observations that the wind was from the east; from the bottom of the page, that it was from the south; from the left-hand side, that it was from the west; from the upper left-hand corner, that it was from the north-west; from the upper right-hand corner, that it was from the north-east; from the lower right-hand corner, that it was from the south-east; from the lower left-hand corner, that it was from the south-west. The number of regular observations at which the wind was blowing from the direction denoted by a line is indicated by the length of that line, .01 of an inch being the unit, or the length of line for one observation. The circles indicate calms, the number of regular observations at which there was no wind being denoted by the length of the radius of the circle drawn about the point of convergence of the lines for a given place or period of time, the length for one observation being, as before, .01 of an inch. Thus, by Diagram XII., page 186, or by Table XIV., page 189, it appears that at Port Huron, in August, 1882, at 16 of the regular tri-daily observations for the month there was a calm; at 16 observations the wind was blowing from the south-west; at 13 from the south; at eight, from the north, etc. For convenient study, the top of these diagrams should be held toward the north. Definite numerical statements corresponding to these diagrams are given in Tables XII., XIII., and XIV., pages 182, 184, and 187-90.

* At the stations of the U. S. Signal Service the observations were made at 7 A. M., 3 P. M., and 11 P. M., Washington mean time.

DIAGRAM XII.—WIND, DIRECTION, AT STATIONS, BY MONTHS, IN 1882.



SCALE. RADIUS OF ONE INCH TO ONE OBSERVATION.
H. B. T. DEC. DES. BY H. B. B.

TABLE XIV.—Number of Observations for each Month of the Year 1882, at which the Wind was Blowing from each of the Eight Principal Points of Compass, at each of 24 Stations* in Michigan; also the average for the 21 of said Stations from which nearly Complete Observations were received for the Year. (Observations made at 7 A. M., 3 P. M., and 9 P. M., Daily.)†

STATIONS IN MICHIGAN.* (Those of U.S.Signal Service in Italics.)	JANUARY.												FEBRUARY.												MARCH.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Calim.			N. N.E.			E. S.E.			S. S.W.			W. N.W.			Calim.			N. N.E.			E. S.E.			S. S.W.			W. N.W.			Calim.			N. N.E.			E. S.E.			S. S.W.			W. N.W.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Diagram XII., page 186, gives 14 lines in this table, and is explained on page 185. *, †, ‡. For these references see foot-notes to this table on page 191. Winfield, Battle Creek, and Mendon are not included in the average line.

TABLE XIV.—CONTINUED.—Direction of Wind, Months in 1882.—Observations at which the Wind was Blowing from Directions Named.

STATIONS IN MICHIGAN.* (Those of U.S. Signal Service in italics.)		Division of the State.*	APRIL.						MAY.						JUNE.																									
			Cal.		N. E.		S. E.		S. W.		W.		N. W.		Total.		Cal.		N. E.		S. E.		S. W.		W.		N. W.		Total.											
Av. for 21 stat.†			90	3	12	16	9	6	5	8	13	18	93	5	11	24	10	9	7	11	9	11	9	11	9	11	9	11	90	7	7	9	8	10	8	15	15	10	—	
<i>Marquette</i>			90	0	15	16	7	7	5	3	5	32	93	3	20	14	5	8	10	8	8	17	9	9	10	8	6	7	16	3	22	9	9	10	8	6	7	16	16	
<i>Escanaba</i>			90	4	33	9	7	3	15	2	2	15	93	10	27	8	10	10	15	3	4	6	18	27	3	4	10	11	2	4	11	27	3	4	10	11	2	4	11	11
<i>Traverse City</i> ...			90	4	30	13	0	3	6	16	4	14	93	5	21	17	9	4	7	18	5	7	90	12	29	17	2	2	8	11	4	5	11	4	5	11	4	5	25	
<i>Alpena</i>			90	0	11	6	16	11	5	3	14	24	93	1	8	8	21	22	6	2	9	6	90	2	1	3	17	20	5	2	15	25	2	15	20	5	2	15	25	
<i>Harrisville</i>			90	0	19	17	8	4	12	1	22	7	93	0	19	24	8	13	11	5	6	7	90	0	5	10	7	13	15	10	24	6	4	11	13	15	10	24	6	4
<i>Grand Haven</i>			90	0	4	23	12	0	15	6	5	25	93	2	5	24	13	5	16	14	5	9	90	0	3	8	15	18	18	19	4	2	3	8	15	18	19	4	2	
<i>Reed City</i>			90	0	17	8	7	21	4	4	7	10	14	5	93	2	17	30	7	3	12	10	8	4	90	10	15	20	2	7	16	14	4	2	7	16	14	4	2	
<i>Port Huron</i>			90	5	25	16	4	4	7	10	14	5	93	2	17	30	7	3	12	10	8	4	90	10	15	20	2	7	16	14	4	2	7	16	14	4	2	7	16	
<i>Thorntonville</i>			90	0	3	25	0	4	0	8	8	42	93	0	2	27	3	8	0	12	10	31	90	2	0	11	2	4	17	26	21	0	11	2	4	17	26	21		
<i>B. & E.</i>			90	15	6	18	9	6	4	10	15	7	91	22	6	19	12	5	3	15	7	2	90	19	3	6	6	7	19	17	7	19	17	7	19	17	7	19		
<i>Agri'l College</i>			90	2	5	9	22	8	4	5	23	12	89	8	1	18	18	12	10	4	10	8	90	6	0	2	16	14	10	9	18	15	15	15	15	15	15	15		
<i>Hastings</i>			90	1	11	22	9	3	3	10	15	16	93	0	2	34	7	9	3	16	15	7	90	0	6	7	8	15	6	23	14	11	11	11	11	11	11			
<i>Lansing</i>			90	0	3	21	13	6	1	12	25	9	93	0	6	25	11	12	3	13	15	8	90	0	3	8	14	14	2	24	19	6	3	8	14	14	2	24		
<i>Otisville</i>			90	0	1	13	7	15	5	32	5	11	93	0	3	21	14	17	2	19	6	11	90	3	0	3	9	19	5	42	6	3	9	19	5	42	6	3		
<i>Winfield</i>			90	1	1	13	7	15	5	32	5	11	93	0	3	21	14	17	2	19	6	11	90	3	0	3	9	19	5	42	6	3	9	19	5	42	6	3		
<i>Ann Arbor</i>			90	0	11	10	16	6	3	8	14	22	93	0	8	15	14	12	9	13	11	11	90	1	4	7	9	14	5	21	17	12	12	12	12	12	12	12		
<i>Battle Creek</i>			90	0	6	16	14	7	3	12	12	20	93	0	2	21	20	8	7	11	12	12	88	0	3	6	11	7	14	3	38	6	3	6	11	7	14	3		
<i>Hillsdale</i>			89	0	8	26	3	6	4	1	13	28	93	0	23	19	0	6	4	13	10	18	90	0	8	14	3	9	3	13	26	14	3	9	3	13	26	14		
<i>Kalamazoo</i>			90	0	10	19	1	2	7	17	11	23	93	0	14	17	2	10	7	18	14	11	90	0	1	14	6	9	7	37	6	10	6	9	7	37	6	10		
<i>Marshall</i>			90	11	6	14	13	5	5	9	11	16	93	16	3	25	8	12	5	10	10	4	90	21	1	11	1	13	5	22	12	4	4	13	5	22	12	4		
<i>Mendon</i>			90	0	8	24	10	3	4	10	15	16	91	0	4	34	1	7	10	10	3	22	78	0	2	14	6	6	11	27	5	7	5	7	5	7	5	7		
<i>Parkville</i>			90	5	5	5	20	7	3	14	8	23	93	7	1	17	13	6	3	14	4	23	90	10	1	6	11	14	7	19	18	4	2	6	11	14	7	19		
<i>Tecumseh</i>			90	12	11	16	10	4	2	8	17	10	93	22	9	12	21	1	2	10	13	3	90	21	0	6	9	2	6	15	25	29	2	6	15	25	29	2		
<i>Detroit</i>			90	0	12	19	9	1	6	9	19	15	93	0	16	19	16	4	15	6	12	5	90	0	5	11	16	11	7	18	15	7	11	16	11	7	18	15	7	
<i>Washington</i>			90	7	5	27	4	6	2	4	12	23	93	15	13	24	3	8	5	8	11	6	90	23	0	11	3	18	2	10	14	9	14	9	14	9	14	9		

*.†. For these references see foot-notes to this table on page 191. Winfield, Battle Creek, and Mendon are not included in the average line.
NOTE.—Graphic representations of statements for 14 lines in this table are given in Diagram XII., page 186, which is explained on page 186.

TABLE XIV.—CONTINUED.—*Direction of Wind, Months in 1882.—Observations at which the Wind was Blowing from Directions Named.*

STATIONS IN MICHIGAN.* (Those of U.S. Signal Service in italics.)		Division of the State.*	JULY.						AUGUST.						SEPTEMBER.							
			Total.	Calm.	N. N.E.	E. S.E.	S. S.W.	W. N.W.	Total.	Calm.	N. N.E.	E. S.E.	S. S.W.	W. N.W.	Total.	Calm.	N. N.E.	E. S.E.	S. S.W.	W. N.W.		
Av. for 21 stations†	93	9 8	5 3	5 10	21 18	14	93	9 8	12 10	11 8	15 9	11	90	9 7	14 10	9 7	13	10	10	—	—	
Marquette.....	93	8 12	4 7	4 8	16 18	16	93	5 21	10 7	11 7	5 6	21	90	6 8	5 12	8 9	13	16	13	—	—	
Escanaba.....	93	10 19	1 2	4 28	7 13	9	93	11 25	10 4	12 14	5 1	11	90	3 17	11 5	19 7	12	4	4	12	4	
Traverse City....	93	10 19	6 4	4 8	30 5	7	93	17 29	8 4	4 4	19 0	8	90	14 18	3 4	11 20	12	4	4	12	4	
Alpena.....	93	2 6	4 3	20 3	15 21	19	93	3 7	2 23	12 9	2 15	20	90	1 8	5 16	16 5	3	22	14	—	—	
Harrisville.....	93	0 8	5 3	11 14	33 12	7	93	0 3	14 13	7 15	17 9	15	90	0 4	3 23	13 16	6	16	9	9	9	
Grand Haven.....	93	2 6	5 6	6 25	17 15	11	93	1 4	23 8	7 16	9 13	12	90	0 8	22 15	5 7	14	10	9	9	9	
Reed City.....	93	0 9	2 1	11 6	25 16	23	93	0 3	6 3	31 8	24 2	16	90	0 2	13 6	17 10	26	2	14	14	14	
Port Huron.....	93	5 16	10 2	1 23	21 12	3	93	16 8	13 11	8 13	16 4	4	90	10 8	27 4	5 9	12	8	7	7	7	
Thornville.....	93	4 0	6 2	3 0	7 29	32	93	4 0	19 1	20 0	6 21	22	90	9 3	11 5	11 1	6	13	31	31	31	
Agri'l College....	93	24 10	3 3	2 7	25 15	4	92	21 13	5 16	7 4	18 6	2	90	30 9	8 14	3 4	12	7	3	3	3	
Hastings.....	C.	92	9 7	5 4	15 6	10	22	14	93	14 7	18 10	9 6	10	13	6	90	20 6	10 15	9 6	9	10	5
Lansing.....	C.	93	1 10	6 3	3 8	31	18	13	93	1 5	14 11	17 5	19	11	10	90	3 5	26 3	12 3	20	14	4
Otisville.....	C.	93	0 3	9 7	5 5	16	39	9	93	0 3	11 23	5 6	18	21	6	90	0 8	20 18	9 3	13	13	6
Winfield.....	C.	93	5 5	6 9	7 5	39	11	6	93	2 6	10 16	17 1	29	9	3	90	6 5	20 5	16 6	26	1	5
Ann Arbor.....	S. C.	93	0 9	3 6	4 12	28	19	12	93	0 5	8 16	18 8	17	13	8	87	0 11	16 8	9 8	14	10	11
Battle Creek.....	S. C.	93	0 20	2 9	4 9	6	24	19	93	0 20	2 14	12 2	17	10	16	90	2 2	7 22	10 3	22	7	15
Hillsdale.....	S. C.	93	0 0	4 1	0 10	7	27	44	93	0 3	13 5	14 5	20	15	18	90	0 3	15 7	9 8	18	11	19
Kalamazoo.....	S. C.	93	0 4	13 0	1 10	39	15	11	93	0 5	16 13	5 4	34	4	12	90	0 9	32 2	6 2	26	5	8
Marshall.....	S. C.	93	32 2	7 3	2 5	22	10	10	92	20 2	7 11	11 8	19	9	5	90	15 0	24 10	5 3	19	7	7
Mendon.....	S. C.	93	0 2	7 6	9 17	18	20	14	89	0 0	9 11	11 4	36	8	10	86	0 15	13 10	8 7	18	11	4
Parkville.....	S. C.	93	16 6	5 3	7 11	21	9	15	93	23 3	9 8	8 5	19	6	12	90	15 1	7 21	5 14	14	6	7
Tecumseh.....	S. C.	91	35 5	0 4	0 1	29	6	11	93	26 5	10 12	4 4	19	10	3	90	31 6	13 4	3 2	12	14	5
Detroit.....	S. E.	93	2 8	5 4	8 19	18	15	14	93	7 5	15 15	6 15	14	10	6	90	9 13	7 16	3 2	10	14	11
Washington.....	S. E.	93	22 7	6 0	2 8	14	22	12	93	29 3	16 3	14 5	10	5	8	90	24 7	18 3	9 2	7	14	6

TABLE XIV.—CONCLUDED.—Direction of Wind, Months in 1882.—Observations at which the Wind was Blowing from Directions Named.

STATIONS IN MICHIGAN.* (Those of U. S. Signal Service in Italics.)	Division of the State.*	OCTOBER.							NOVEMBER.							DECEMBER.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		Total.	Calm.	N. N.E.	E. S.E.	S. S.W.	W. N.W.	Total.	Calm.	N. N.E.	E. S.E.	S. S.W.	W. N.W.	Total.	Calm.	N. N.E.	E. S.E.	S. S.W.	W. N.W.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Av. for 21 stations†		93	9	5	9	7	13	15	15	11	9	90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

* i. † For these references see foot-notes to this table on page 191. Winfield, Battle Creek, and Mendon are not included in average line.
NOTE.—Graphic representations of statements for 14 lines in this table are given in Diagram XII., page 186, which is explained on page 186.

DIAGRAMS RELATING TO METEOROLOGICAL CONDITIONS.

Most of the diagrams in this paper are to be read by tracing each irregular line across the diagram from left to right, and noting at what point it intersects each of the perpendicular lines having the name of a month at the top. What station is represented by the irregular line may be learned from the head of the diagram. The degree or value denoted by the intersection may be learned by referring to the figures in the left-hand column. Thus in Diagram I, page 135, relating to average temperature in 1882, tracing the line— $\times \times \times$, representing Marquette, it may be seen that the average temperature at Marquette was, in January, about 21° , in February about 28° , in April about 36° , in July about 63° , in Oct. about 50° , etc. Definite numerical statements of the average temperature for each month at each station may be found in Table I., page 134, and accompanying each diagram is a table giving exact numerical statements for the conditions represented. The average line given in each table is in the corresponding diagram represented by an \times line, thus $\times \times \times \times \times \times$. The lines in the diagrams give more ready general comparisons of stations with each other, or of months with each other, than is possible from the mere numerical statements. By Diagram II., page 143, it appears at a glance that the average daily range of temperature at Reed City, in 1882, was, from January to October, inclusive, much greater than at any other of the ten stations represented in that diagram. The marked agreement in the course of the lines in Diagram I., page 135, representing mean monthly temperature at seven stations, and also that the agreement is closer in the last three months of the year than in earlier months, appear at once on reference to the diagram. The resemblance between the lines in Diagram I., relating to mean temperature by months in 1882, and those in Diagram III., page 147, relating to absolute humidity of the atmosphere for the same periods, is apparent. By Diagram X., page 176, it appears that in every month of the year the highest velocity of the wind (on an average for the month) is reached between 12 M. and 4 P. M., and that the lowest velocity occurs in the latter part of the night or in early morning, and that in 1882, at Lansing, the months of most wind were February and March. By reference to Diagram XI., page 181, it may be seen that at other stations in Michigan where records of actual miles of wind traveled were kept, February and March were, in 1882, the months of greatest wind. In 1881, as observed at Lansing, November was the month of most wind, as may be seen by Diagram XXIII., page 179. These statements illustrate the reading of the diagrams for any use it may be desired to make of the tables and diagrams. The three diagrams relating to direction of wind are differently constructed, and the manner of reading them is explained on page 185 of this article.

FOOT-NOTES TO TABLE XIV, PAGES 187-190.

* For names of observers, etc., see Exhibit II, page 122. For names of divisions, etc., see Exhibit I, page 5, or a map on page 113.

† With exceptions stated for U. S. Signal Service Stations in Table IV., page 146.

‡ This line includes only the 21 stations from which statements complete, or nearly complete, were received for every month of the year: it does not include Winfield, Battle Creek, or Mendon.

EXHIBIT 38.—*Comparison of the Average Atmospheric Pressure during the Year and during each Month of the Year 1882, with Averages for the 7 Years 1875-81, and for the Year 1881. Corrected for Temperature and for Instrumental Error. Observations made at 7 A. M., 2 P. M., and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

YEARS, ETC.	AVERAGE ATMOSPHERIC PRESSURE—INCHES OF MERCURY.												
	Ann. Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 7 yrs, '75-81.	29.042	29.061	29.044	28.973	28.988	29.052	29.008	29.048	29.055	29.083	29.068	29.064	29.066
1881.....	29.087	29.077	29.152	28.899	29.064	29.116	29.018	29.093	29.117	29.077	29.181	29.120	29.134
1882.....	29.094	29.134	29.041	29.098	29.088	29.065	28.959	29.006	29.062	29.186	29.112	29.175	29.112
In 1882 Great- er than Av. for 1875-81....	.062	.073	-----	.125	.100	.013	-----	.048	.007	.103	.044	.111	.046
In 1882 Less than Av. for 1875-81.....	-----	-----	.003	-----	-----	-----	.049	-----	-----	-----	-----	-----	-----
In 1882 Great- er than in '81	.007	.067	-----	.199	.024	-----	-----	.003	-----	.109	-----	.055	-----
In 1882 Less than in '81....	-----	-----	.111	-----	-----	.051	.059	-----	.055	-----	.069	-----	.022

EXHIBIT 39.—*Average Atmospheric Pressure, by Year and Months, in 1882, compared with Annual and Monthly Averages for the 6 Years, 1877-82.*

YEARS, ETC.	AVERAGE ATMOSPHERIC PRESSURE—INCHES OF MERCURY.												
	Ann. Av.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 6 years, 1877-82.....	29.141	29.193	29.177	29.129	29.092	29.133	29.063	29.102	29.111	29.168	29.167	29.185	29.164
1877 (7 stations)*.	29.145	29.211	29.267	29.152	29.114	29.143	29.042	29.064	29.063	29.144	29.135	29.164	29.242
1878 (7 stations)*.	29.116	29.241	29.166	29.137	28.987	29.061	29.043	29.084	29.041	29.194	29.139	29.168	29.104
1879 (13 stations)*	29.155	29.169	29.173	29.163	29.122	29.176	29.121	29.091	29.106	29.188	29.221	29.152	29.176
1880 (14 stations)*	29.133	29.134	29.105	29.191	29.048	29.092	29.085	29.106	29.163	29.153	29.150	29.231	29.139
1881 (12 stations)*	29.151	29.209	29.222	28.979	29.120	29.175	29.082	29.146	29.180	29.122	29.220	29.164	29.187
1882 (20 stations)*	29.143	29.192	29.126	29.154	29.161	29.130	29.006	29.121	29.115	29.205	29.139	29.229	29.138
In '82 Greater than Av. 1877-82	.002	-----	-----	.025	.069	-----	-----	.019	.004	.037	-----	.044	-----
In '82 Less than Av. 1877-82....	-----	.001	.051	-----	-----	.003	.057	-----	-----	-----	.028	-----	.026

* Kalamazoo for 6 years 1877-82; also Battle Creek for 5 years 1877-80, 1882; Detroit for 5 years 1878-82; Woodmere Cemetery (near Detroit) for 3 years 1877-79; Mendon for 1877, 1878, 1881, 1882; Marquette, Alpena, Grand Haven, Port Huron, and Lansing for 4 years 1879-82; Benton Harbor for 1877, 1878; Ypsilanti for 1877, 1879; Agricultural College for 1877, 1881, 1882; Otisville for 1878-80, 1882; Tecumseh and Washington for 1879, 1880, 1882; Nirvana for 1879, and in 1880 to April 25 inclusive; Reed City in 1880 after April 25, and for 1881, 1882; Thornville for 1880, 1881; Escanaba for 1880, 1882; Ann Arbor for 1881, 1882; Traverse City, Harrisville, Hastings, and Hillsdale for 1882.

Graphic representations of statements in Exhibit 39 are given in Diagram XXV., page 193.

DIAGRAM XXV.-ATMOSPHERIC PRESSURE, BY MONTHS, 1877-82.

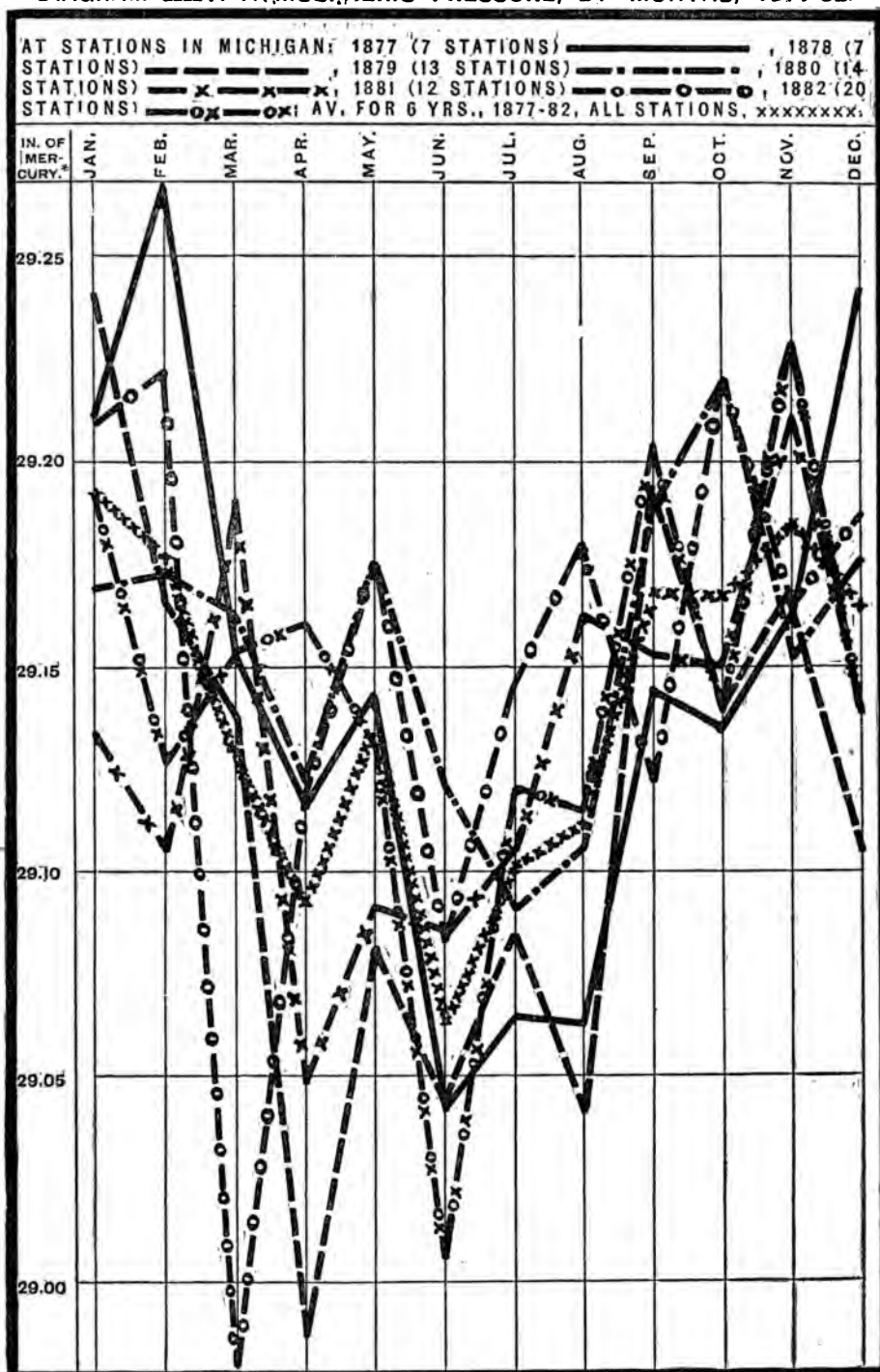


TABLE XVII.—Average Atmospheric Pressure for the Year, and for each Month in the Year 1882, at 20 Stations in Michigan, as indicated by the Height, in inches, of Mercury in the Barometer. Corrected for Temperature,—Reduced to 32° F., for some Stations not corrected for Instrumental Errors*—Average of Observations made Daily at 7 A. M., 2 P. M., and 9 P. M.,† by Observer‡, for the State Board of Health and for the U. S. Signal Service.

STATIONS IN MICHIGAN.†		Divis- ion of the State †	INCHES OF MERCURY.—ATMOSPHERIC PRESSURE.											
(Those of U. S. Signal Service in Italics.)			MONTHS, 1882.											
YEARS.			MONTHS, 1882.											
Norm.‡	1882.		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 20 stations.¶														
29.330 0	29.283	29.292	29.210	29.302	29.364	29.318	29.178	29.247	29.302	29.364	29.226	29.363	29.261	
29.443	29.443	29.392	29.287	29.356	29.396	29.357	29.216	29.308	29.343	29.411	29.296	29.432	29.343	
29.365	29.365	29.378	29.315	29.364	29.395	29.376	29.255	29.380	29.344	29.435	29.296	29.432	29.346	
29.367 0	29.367	29.378	29.337	29.378	29.385	29.374	29.217	29.325	29.344	29.437	29.242	29.444	29.344	
29.341	29.341	29.341	29.341	29.341	29.366	29.345	29.211	29.306	29.353	29.436	29.364	29.433	29.359	
29.341 0	29.341	29.341	29.328	29.358	29.368	29.359	29.218	29.331	29.322	29.419	29.243	29.438	29.350	
29.325 4	29.325	29.325	29.328	29.366	29.384	29.353	29.749	29.876	29.815	29.945	29.878	29.957	29.860	
29.340 4	29.346	29.339	29.339	29.360	29.341	29.311	29.203	29.284	29.375	29.407	29.362	29.446	29.352	
29.033	29.033	29.041	29.007	29.022	29.097	29.082	29.895	29.050	29.062	29.121	29.051	29.175	29.036	
29.034	29.034	29.034	29.016	29.028	29.068	29.065	29.895	29.096	29.098	29.186	29.112	29.175	29.036	
29.193	29.193	29.252	29.166	29.193	29.103	29.172	29.054	29.184	29.163	29.259	29.193	29.313	29.176	
29.041	29.041	29.063	29.063	29.033	29.097	29.095	29.894	29.046	29.039	29.129	29.064	29.145	29.064	
29.041	29.041	29.091	29.123	29.139	29.138	29.072	29.749	29.859	29.894	29.944	29.893	29.145	29.064	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034	29.071	29.047	29.009	29.923	29.050	29.030	29.119	29.060	29.143	29.057	
29.043	29.043	29.076	29.034											

* For stations marked thus a correction has been made for instrumental error as follows: For Marquette .004 added; for Escanaba .012 added; for Alpena .006 added; for Grand Haven .002 added; for Port Huron .001 subtracted; for Detroit .017 added. For other stations the instrumental error of barometer is not given. The U. S. Signal Service for the year 1882 the observations were made at 7 A. M., 3 P. M., and 11 P. M., Washington mean time. The corresponding local time for each of these stations is stated in the star (†) foot-note to Table IV, page 146.

† The names of observers, their places of observation and the counties in which these places are situated, are stated in Exhibit II, page 122. The full names of divisions, and the counties in which these divisions are situated, are stated in Exhibit I, page 5.

‡ Numbers in this column state the average annual atmospheric pressure, for a period of years ending in each case with Dec. 31, 1882. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

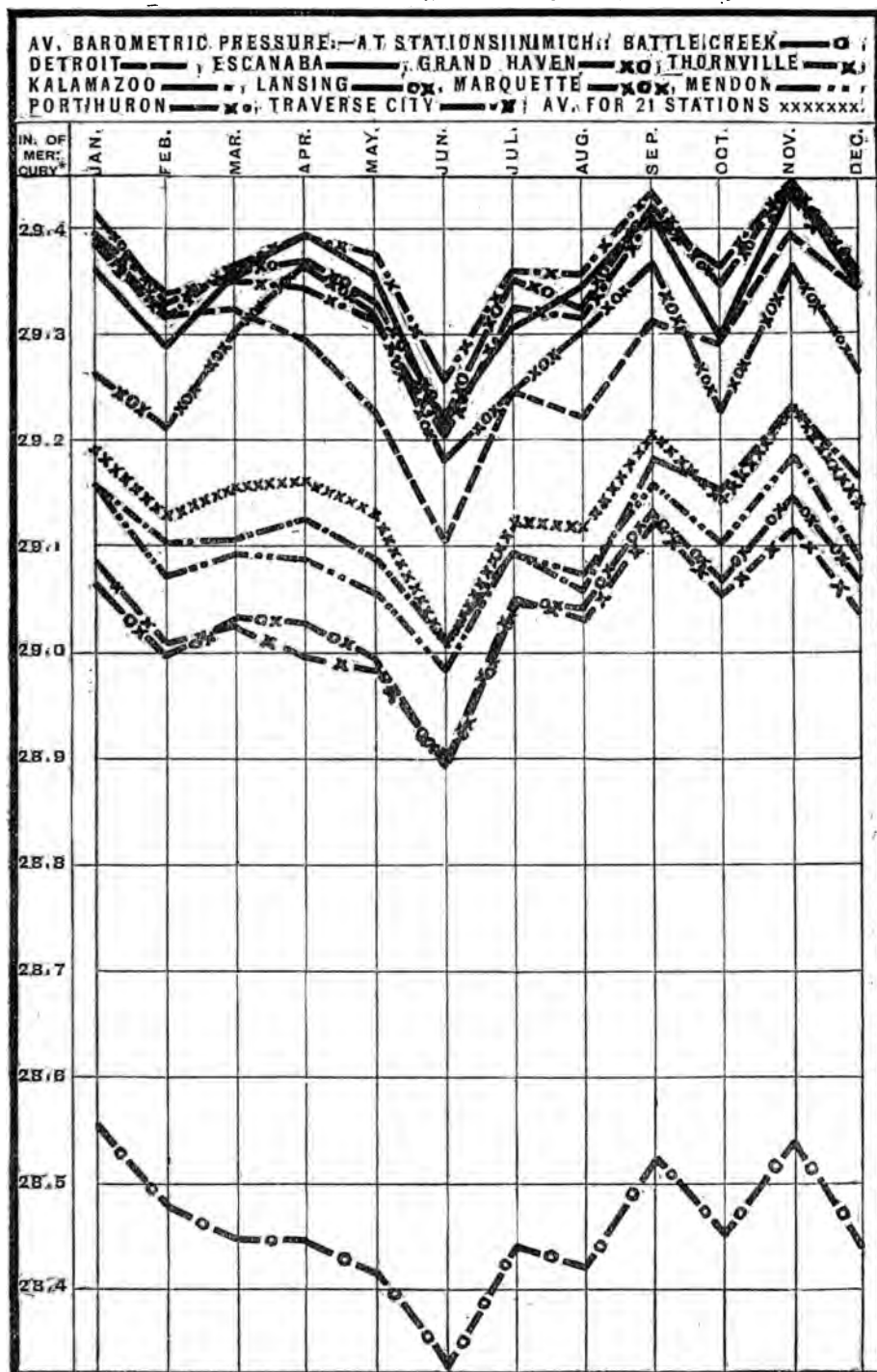
¶ This line is an average for only 20 stations. Green's standard barometer was used at all these 20 stations except Kalamazoo. The barometer at Kalamazoo was manufactured by J. Foster, Cincinnati, Ohio. The average line does not include the line for Thornville, an aneroid barometer having been used at that station in 1882.

§ For 20 days. b For 25 days. c For 27 days. d For 28 days. e For 29 days. f For 30 days. g For 31 days. h For 32 days. i For 33 days. j For 34 days. k For 35 days. l For 36 days. m For 37 days. n For 38 days. o For 39 days. p For 40 days. q For 41 days. r For 42 days. s For 43 days. t For 44 days. u For 45 days. v For 46 days. w For 47 days. x For 48 days. y For 49 days. z For 50 days.

‡‡ At stations in this Table are graphically represented in Diagram XV, page 105. Marquette, Escanaba, Grand Haven, Ann Arbor, and Detroit. Kalamazoo and Port Huron were determined by the observations of the observer at the office of the State Board of Health.

‡‡‡ Daily averages only, by observers at Alpena and Port Huron. The remainder of the computations were made at the office of the State Board of Health.

DIAGRAM XV.—ATMOSPHERIC PRESSURE, BY MONTHS, IN 1882.



SCALE, ONE INCH OF MERCURY TO 5.7 IN. VERTICALLY.
H. B. T. DEL. DES. BY H. B. B.

TABLE XV.—Average Daily Range of Atmospheric Pressure (as determined from three daily observations*), for the Year 1882, for Nine and at each of Nine Stations in Michigan.—Stations arranged in order by Latitude, those farthest North first.

STATIONS.†	AVERAGE DAILY RANGE OF BAROMETER,—YEAR AND MONTHS, 1882.													Latitude.‡	Elevation above Sea.§ (Feet.)
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		
Average for 9 Stations.....	.206	.331	.322	.356	.189	.157	.159	.119	.094	.145	.195	.186	.222	43°39'	806.32
Average for 8 Stations‡.....	.211	.338	.330	.362	.192	.158	.163	.123	.095	.148	.200	.189	.225	43°52'	765.36
Marquette....	.224	.360	.339	.372	.191	.133	.171	.141	.106	.174	.271	.206	.223	46°33'	638.07
Escanaba.....	.223	.359	.333	.370	.204	.145	.171	.145	.101	.180	.251	.203	.218	45°46'	598.54
Traverse City	.218	.342	.348	.378	.201	.164	.187	.131	.081	.143	.202	.189	.249	44°45'	598.00
Reed City.....	.214	.344	.388	.353	.198	.170	.164	.118	.096	.145	.183	.194	.219	43°44'	1,016.00
Grand Haven.	.204	.332	.304	.367	.196	.163	.156	.120	.088	.141	.180	.186	.213	43°5'	595.30
Lansing,S.B.H.	.202	.321	.313	.356	.180	.156	.152	.113	.106	.134	.184	.182	.223	42°44'	917.00
Ann Arbor....	.196	.311	.306	.354	.185	.164	.150	.102	.092	.127	.170	.170	.225	42°17'	930.00
Tecumseh.....	.199	.331	.307	.348	.183	.166	.150	.111	.089	.139	.159	.181	.227	42°1'	825.00
Hillsdale.....	.176	.281	.261	.305	.164	.156	.134	.088	.083	.119	.154	.163	.202	41°55'	1,139.00

TABLE XVI.—Range of Atmospheric Pressure (as determined from three daily observations*) for the Year and for each month of the Year 1882, at Nine and at each of Nine Stations in Michigan. Stations named in order by Latitude, those farthest north first.

STATIONS.†	RANGE OF BAROMETER.—YEAR AND MONTHS, 1882.													
	Year.	Av. Mo.	Jan.	Feb.	Mar.	Apr.	May.	J'ne.	J'ly.	Aug.	Sep.	Oct.	Nov.	Dec.
For 9 stations.....	1.992	1.473	1.741	1.959	1.860	1.582	1.358	1.329	1.031	1.043	1.300	1.250	1.502	1.715
Av. for 9 stations.....	1.424	.900	1.133	1.320	1.275	1.029	.812	.787	.564	.528	.742	.743	.898	.974
Av. for 8 stations‡.....	1.447	.915	1.151	1.346	1.292	1.053	.810	.794	.573	.525	.757	.767	.915	.997
Marquette.....	1.423	.974	1.148	1.374	1.340	.903	.620	.747	.731	.527	.879	1.032	1.000	1.390
Escanaba.....	1.367	.946	1.173	1.301	1.262	.997	.715	.847	.680	.526	.852	.952	.978	1.066
Traverse City.....	1.556	.942	1.158	1.409	1.334	1.152	.909	.919	.528	.429	.764	.792	.957	.958
Reed City.....	1.440	.922	1.189	1.329	1.313	1.058	.867	.812	.522	.506	.756	.758	.989	.963
Grand Haven.....	1.491	.916	1.262	1.366	1.369	1.095	.840	.753	.514	.501	.715	.750	.910	.921
Lansing, S. B. of H. ...	1.454	.903	1.174	1.366	1.362	1.074	.832	.799	.576	.549	.734	.685	.786	.898
Ann Arbor.....	1.421	.848	1.058	1.331	1.086	1.079	.849	.742	.502	.563	.690	.583	.841	.855
Tecumseh.....	1.427	.869	1.049	1.295	1.266	1.065	.851	.733	.528	.599	.668	.582	.862	.925
Hillsdale.....	1.241	.783	.987	1.110	1.146	.842	.823	.729	.491	.548	.620	.551	.759	.791

* The observations were made at 7 A. M., 2 P. M., and 9 P. M., local time, except at the U. S. Signal Service Stations, Marquette, Escanaba, and Grand Haven, at which stations the observations were made at 7 A. M., 3 P. M., and 11 P. M., Washington mean time. The local time corresponding to these hours is stated in a foot-note to Table IV., page 146.

† The average atmospheric pressure at each of these stations, by months in 1882, is given in Table XVII., page 194.

‡ Not including Hillsdale.

§ See foot-notes on latitude and elevation of some of these stations in Exhibit 12, page 123.

WEEKLY REPORTS OF DISEASES IN MICHIGAN DURING THE YEAR 1882.

Report by the Secretary of the State Board of Health.

This paper presents a summary for the year 1882 of the weekly reports of diseases received by the State Board from health officers of cities and villages, and from regular correspondents of the Board. It continues a subject begun in the Report of the State Board of Health for the year 1876, and continued in each subsequent Report. Weekly reports are now regularly received concerning 26 diseases; observers are also asked to add reports concerning any important disease which may occur, the name of which is not printed on the blank; inflammation of kidney was first printed on the blank reports in July, 1883.

The names and addresses of observers whose reports have been compiled for 1882, are printed in Exhibit 42, pages 218-9. These observers are entitled to great credit for their unpaid services in making the reports. That it is a considerable tax on the time and thought of a busy practitioner to make a regular weekly report is evident; but no one else has so great a knowledge of the facts which it is desirable to have reported, and as a rule, perhaps from his frequent observation of the misery and want consequent on sickness, no one is found more ready to coöperate in efforts to lessen preventable sickness. From a few other observers occasional reports have been received, but so irregular that they could not well be used in this compilation. The omission of a report for any week increases the work and impairs the value of the compilation. In acknowledging the general regularity with which the weekly reports have been made, it is proper to express the hope that observers will continue to be regular and prompt in making their reports.

PLAN OF THE REPORTS.

The method of securing and the plan of marking these reports may be thus stated:—

The blanks for the weekly reports are printed on postal cards, which are supplied to the observers of diseases. Blank record-books, in which to preserve copies of the reports, remarks, etc., are also supplied to these observers, to be retained by them. The reports are forwarded weekly to the Secretary of the State Board of Health, at Lansing.

The plan of making the report is as follows: Each observer is requested to mark the disease of which there was the greatest number of cases during the week for which the report is made, 1; that of which there was the next greatest number of cases, 2; the next 3, and so on, applying *consecutive* numbers to the diseases reported present; but marking with the *same* figure all diseases of which there is the same number of cases; to write 0 opposite each disease mentioned of which there was no case; to apply these numbers without regard to severity of the cases; to include all cases, without regard to when they were taken sick, so long as they are actually sick with the given disease; to include all cases within the knowledge or reasonable belief of the observer, without regard to who may have charge of them; to indicate the severity of the diseases reported by the signs =, +, and -, denoting respectively that a disease was usually severe, more than usually, or less than usually severe. It has not seemed best to ask for an exact statement of the number of cases, though a blank is left for that purpose on the margin of the card, for the convenience of those observers who prefer to state the number of cases rather than the order of prevalence by the foregoing method.

To illustrate the method of making the reports the following copy of one of the blanks now in use is given, correctly marked, in the "prevalence" column, for the number of cases stated on the

right-hand margin. It should be remembered that the numbers in the "prevalence" column denote simply the relative order in which the several diseases appear to be prevalent, and do not denote a definite number of cases; so that a disease might one week be marked 4, and the following week, with the same number of cases, be marked 1. Names of diseases, and figures printed in italics are not *printed* on the postal blanks, but are supposed to have been *written* on the report by the observer.

Diseases in
 [PLEASE DATE.]
week ending Sat., 188.....

No.		Prevalence. Order. See a.	Severity. See b.	Cases.
Ed. 20.	Brain, Inflammation of.....	14	+	1
	Bowels, Inflammation of....	12	—	3
	Bronchitis.....	11	=	4
	Cerebro-spinal Meningitis.	0	-----	0
	Cholera Infantum.....	8	—	9
	Cholera Morbus.....	10	+	6
	Consumption, Pulmonary..	10	—	6
	Croup, Membranous.....	12	+	3
	Diphtheria.....	5	=	14
	Diarrhea.....	3	=	17
	Dysentery.....	8	+	9
	Erysipelas.....	13	=	2
	Fever, Intermittent.....	2	+	21
	Fever, Remittent.....	11	=	4
	Fever, Typhoid (Enteric)...	0	-----	0
	Fever, Typho-malarial.....	9	+	7
	Influenza.....	7	—	11
	Kidney, Inflammation of....	14	=	1
	Measles.....	1	=	27
	Neuralgia.....	14	+	1
	Pneumonia.....	9	=	7
	Puerperal Fever.....	0	-----	0
	Rheumatism.....	6	+	12
	Scarlatina.....	4	+	16
	Small-pox.....	0	-----	0
	Tonsillitis.....	11	—	4
	Whooping-cough.....	0	-----	0
	Mumps.....	6	+	12
	Dyspepsia.....	11	+	4

....., M. D.

IMPORTANCE OF REPORTS WHEN AND WHERE NO SICKNESS EXISTS.

In the summer of 1882 several observers wrote that there was not sickness enough to make it worth while to send reports. In order to set forth the importance of having reports made regularly, whether there is much or little sickness, the following circular was therefore sent to all the observers:

MICHIGAN STATE BOARD OF HEALTH,
 Office of the Secretary, Lansing, Michigan, July 21, 1883. }

To Observers of Diseases for the State Board of Health:

GENTLEMEN,—The cool weather of June and July seems to be attended, in many parts of the State, with less sickness, from several diseases, than is usual at this season of the year. Apparently on account of this, a few observers have neglected to make the regular weekly reports, stating that there was not sickness enough to report, or have reported less definitely than usual con-

cerning the diseases on the printed blanks. Now, it is just as important, for the purposes of learning the causes of sickness by means of a compilation of facts, to know when, where, and under what conditions there is no sickness, or but little sickness, from any disease, as to know when there is much sickness from that disease; and the present seems to be an exceedingly favorable opportunity which it is hoped may not be lost. It is therefore earnestly requested that every observer will carefully note and report the facts concerning *each disease* on the postal blank, whether there be much sickness, little sickness, or no sickness from the disease. General statements concerning the amount of sickness, though very useful in a compilation, cannot supersede definite statements concerning each disease, such as is provided for on the blank report-card.

Very respectfully,

HENRY B. BAKER,
Secretary.

COMPILATION OF THE REPORTS.

The method of compiling the reports is set forth in connection with tables on the following pages; it is somewhat more fully explained on pages 306, 307, and 310 of the Report for 1881. Table 3, giving statements by months for each locality from which reports were received for 1882 has been prepared, but, to avoid making a bulky volume, it is not printed in this Report. The manuscript is preserved for reference and future study.

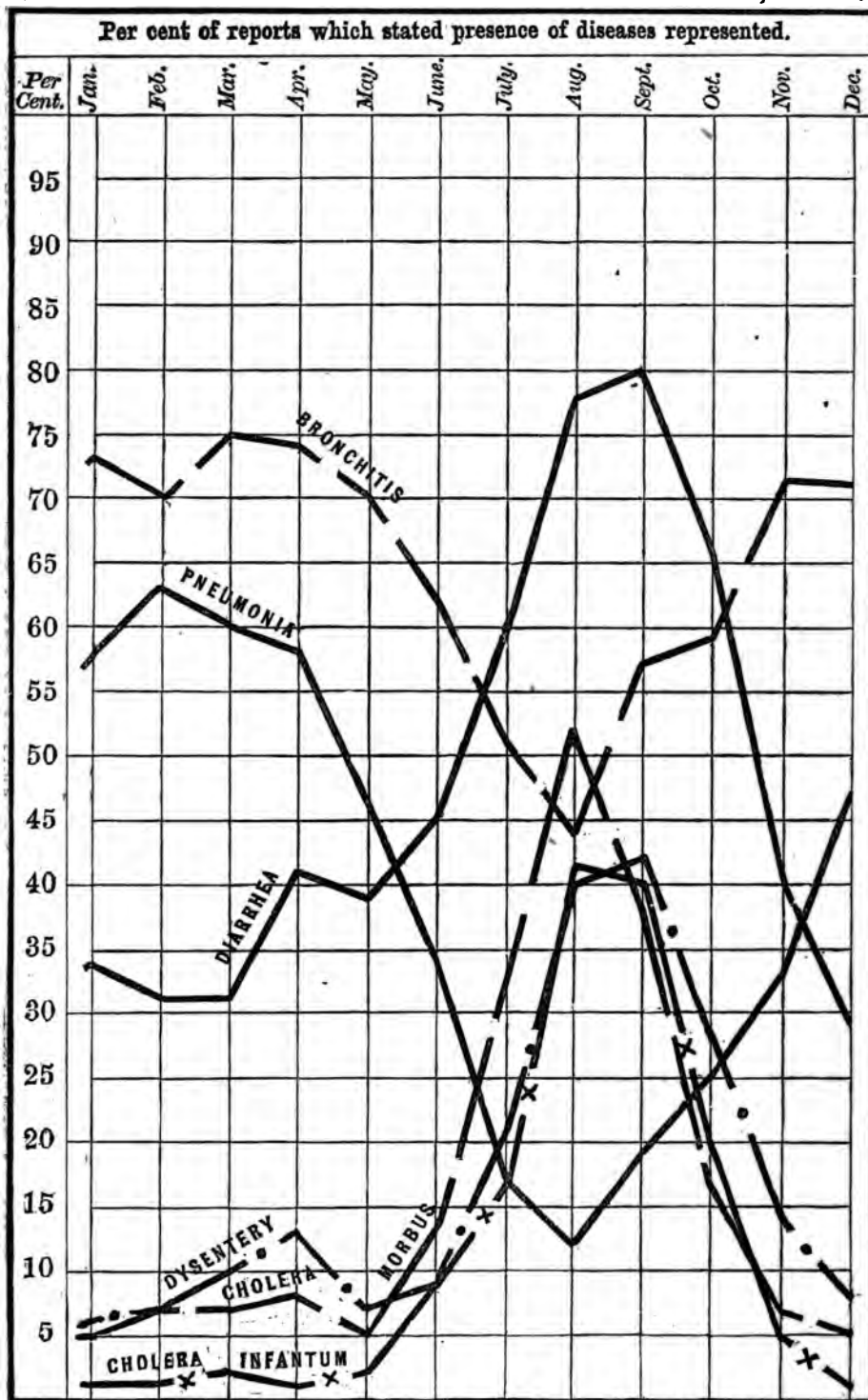
One of the best indications afforded by the weekly reports, as to the relative prevalence of the several diseases is to be found by noting what per cent of the reports received for a given time stated the presence of each disease. This per cent has been computed for each disease by months and for the year 1882. It is thus stated in Exhibit 40, page 201, which also states the per cent for each disease for each of the preceding five years. What per cent of reports stated the presence of each disease by months in 1882 is also graphically represented in Diagrams 1-5, on page 200, and following pages.

For several diseases a comparison has been attempted of the amount of sickness in 1882 (as indicated by the proportion of reports stating presence of the disease) with the average amount for a period of five years. These comparisons are stated in Exhibits 47, 49, 54, and 56. This comparison may also be facilitated by reference to Table 1, pages 203-5, in which is stated for each of the years 1877-82, and by months in each of those years, by what per cent of the observers reporting for the given month (or for an average month of the year) the several diseases were reported.

A study of the reported sickness from 18 of the diseases, in connection with meteorological conditions, by months in 1882, is made in Exhibit 46, and following exhibits. By arranging months in order of greatest prevalence of the disease under consideration, noting whether it was more or less prevalent than the average for the year, and noting what were the meteorological conditions for the same months as compared with the average for the year, relations and conditions are grouped for convenient comparison. A summary of one line of the evidence of these exhibits is given in Exhibits 60 and 61.

In Exhibits 43 and 44, pages 220 and 221, the leading diseases are arranged in order according to greatest amount of sickness reported from them in 1882, as thus affording an indication as to what diseases cause most sickness. It will be noticed that while for the State intermittent fever heads the list, as in former years, it was not in 1882 reported on so great a per cent of the reports as in the three preceding years; also that most of the other diseases represented in Exhibit 43 were reported on a less per cent of the reports in 1882 than in 1881, so that the average for 26 diseases is less by 3 per cent in 1882 than in 1881. The comparison with former years is facilitated by reference to Exhibit 40, page 201, Table 1, pages 203-5, and Exhibits 47, 49, 54, and 56, on following pages.

DIAGRAM 1—WEEKLY REPORTS OF DISEASES IN MICHIGAN, IN 1882.



LEWIS ENG. CO BOSTON

Designed by Henry B. Baker

EXHIBIT 40.—*Stating for each of 26 Diseases for the six Years ending Saturday, December 30, 1882, for each of those Years, and by Months of the Year 1882, on what Per Cent of the Reports Received the Disease was stated to be Present.—Compiled from Weekly Reports by Health Officers of Cities and Villages, and by Regular Correspondents of the State Board of Health.**

DISEASES.	WHAT PER CENT OF REPORTS RECEIVED STATED PRESENCE OF THE DISEASE.																		
	AV., 1877-82.	YEARS.						MONTHS, 1882.											
		1877.	1878.	1879.	1880.	1881.	1882.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average.....†	31	28	30	33	32	33	30	31	30	30	30	29	28	28	30	34	32	31	29
Brain, Inflamm. of.....‡	—	—	—	—	6	5	5	4	5	4	7	6	6	3	5	6	4	4	5
Bowels, Inflamm. of.....‡	—	—	—	—	12	14	13	14	14	14	12	9	14	13	13	14	16	14	16
Bronchitis.....	62	55	64	64	64	62	65	73	70	75	74	70	62	51	44	57	59	71	71
Cerebro-spinal Men... ..	4	3	2	2	2	9	6	7	8	8	9	7	8	4	6	7	3	4	3
Cholera Infantum.....	13	11	11	14	14	18	12	1	1	2	1	2	9	17	41	40	20	5	1
Cholera Morbus.	19	15	14	19	20	26	17	5	7	7	8	5	13	32	52	38	17	7	5
Consumption, Pulm.‡	66	52	71	70	68	71	66	66	68	66	66	69	66	67	63	63	65	62	65
Croup, Membranous..	7	6	7	7	6	9	7	10	9	8	7	6	4	3	3	5	9	10	9
Diphtheria	26	19	23	29	27	34	25	37	32	25	26	22	17	16	14	23	28	28	28
Diarrhea.....	46	41	41	48	47	52	48	34	31	31	41	39	45	60	78	80	66	40	29
Dysentery.....	19	21	19	18	18	23	17	6	7	10	13	7	9	21	40	42	28	14	8
Erysipelas.....	23	20	21	25	25	23	22	25	22	22	25	23	22	21	19	18	26	23	24
Fever, Intermittent..	79	75	82	82	82	82	71	59	60	65	68	76	76	77	80	82	80	69	61
Fever, Remittent.....‡	54	52	58	57	56	54	48	45	39	38	44	49	44	47	55	61	60	51	42
Fever, Typhoid.....	14	14	10	12	14	18	14	21	16	12	8	7	9	8	11	17	23	23	16
Fever, Typho-mal.....‡	25	26	24	22	24	29	24	26	23	19	18	15	13	14	21	40	47	37	23
Influenza.....	41	41	44	45	42	35	40	48	51	52	47	40	33	21	19	33	40	44	52
Measles.....	13	7	5	12	19	26	11	10	11	15	13	21	21	17	6	3	4	7	10
Neuralgia.....‡	—	—	—	59	64	65	68	69	67	69	73	71	69	64	61	64	64	74	72
Pneumonia.....	41	40	41	41	42	41	39	58	63	60	58	46	34	17	12	19	25	33	47
Puerperal Fever.....	4	4	3	3	3	5	7	6	9	6	4	9	10	10	5	7	8	10	5
Rheumatism.....	68	60	68	72	71	71	68	70	67	70	71	65	69	66	61	62	70	71	74
Scarlatina.....	20	21	25	23	15	19	18	22	24	23	19	15	22	14	10	12	15	19	18
Small-pox.....	2	4	0.2	0.4	0.4	2	3	7	5	3	5	7	5	4	1	0	2	2	1
Tonsillitis.....‡	—	—	—	45	49	48	48	57	59	53	52	47	43	35	31	37	45	54	65
Whooping-cough.....	22	21	21	23	32	16	17	18	19	20	15	14	15	19	20	20	16	16	13
No. of reports rec'd...	3767	3320	3221	3755	3991	3567	4745	387	398	477	336	459	343	346	495	381	358	430	335

* For 1882, the names of observers are stated in Exhibit 42, pages 218-219.

† This line is an average for such of the tabulated diseases as were reported present in the given month or year.

‡ See foot-note with this mark in Table 1, pages 203-5.

[Statements in this exhibit for months in 1882 are graphically represented in Diagrams 1, 2, 3, 4, 5, opposite this page and on following pages.]

EXHIBIT 41.—*Stating, by Months of the Year ending Saturday, December 30, 1882, for the State, and for each of the Ten Geographical Divisions of Michigan from which Weekly Reports of Diseases were received, the Number of Reports Received; the day on which, for the purposes of this compilation, each month is made to end; and the Number of Weeks thus included in each Month.*

MONTHS, 1882.	MONTHS AND YEAR END SATURDAY,	Number of Weeks.	DIVISIONS OF THE STATE.*																							
			STATE.		1. UPPER PE- NINSULAR.*		2. NORTH- WESTERN.*		3. NORTH- EASTERN.*		5. WESTERN.*		6. NORTHERN CENTRAL.*		7. BAY AND EASTERN.*		8. CENTRAL.*		9. SOUTH- WESTERN.*		10. SOUTHERN- CENTRAL.*		11. SOUTHERN- EASTERN.*			
			Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†	Observers.	Reports.†		
Year, 1882.....	Dec. 30, 1882..	52	159	4,745	10	162	5	110	2	73	16	380	4	165	19	652	34	926	13	451	40	1,333	16	493		
Av. per month.....	.....	---	93	395	3	14	2	9	1	6	8	32	3	14	13	54	18	77	9	38	26	111	10	41	
January.....	Jan. 28.....	4	97	387	3	12	2	8	1	4	8	32	3	12	13	52	20	80	12	48	28	103	9	36		
February.....	Feb. 25.....	4	100	398	3	12	2	8	1	4	9	36	3	12	13	52	19	76	12	48	28	111	10	30		
March.....	April 1.....	5	98	477	3	13	2	10	1	5	9	42	3	15	14	70	18	90	12	57	26	139	10	46		
April.....	April 29.....	4	86	336	3	11	2	7	1	4	7	27	3	12	13	51	18	72	10	39	22	86	7	27		
May.....	June 3.....	5	95	459	4	17	1	5	1	5	6	30	4	20	12	58	20	98	11	53	25	121	11	52		
June.....	July 1.....	4	87	343	4	15	2	8	1	3	4	15	4	16	13	52	16	64	6	24	26	102	11	44		
July.....	July 29.....	4	88	346	3	12	2	8	1	4	5	19	3	12	13	51	16	64	7	27	27	106	11	43		
August.....	Sept. 2.....	5	101	495	4	19	3	15	2	10	8	38	3	15	14	69	19	94	8	39	20	141	11	55		
September.....	Sept. 30.....	4	96	381	2	8	3	12	2	8	9	34	3	12	14	56	18	72	7	28	28	111	10	40		
October.....	Oct. 28.....	4	91	358	2	7	3	12	2	8	9	35	3	12	11	43	18	72	7	27	26	103	10	39		
November.....	Dec. 2.....	5	88	430	4	16	2	9	2	10	9	45	3	15	11	54	16	80	7	33	26	128	8	40		
December.....	Dec. 30.....	4	84	335	5	20	2	8	2	8	7	27	3	12	11	44	16	64	7	28	23	92	8	32		

* For counties in each division, see Exhibit 1, page 5; also a map on page 113.

† From some of the observers reports were not received for every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks in the given month or in the year.

‡ In some localities there were more observers than one. The whole number of localities from which reports were received was 122; the average number per month was 81. The names of observers and number of cards received from each observer for each month and for the year is stated in Exhibit 42, pages 218-9.

TABLE 1.—*Stating, by Months in each of the Five Years ending Saturday, December 30, 1882, also by a Monthly Average for each of those Years and for the entire period, by what Per Cent of Observers each of 26 Diseases was Reported Present (also the Number of Observers Reporting for the Month).—Compiled from Weekly Reports by Health Officers of Cities and Villages and from Regular Correspondents of the State Board of Health.*—Diseases arranged by Year and Months in order of Greatest Number of Observers reporting them present in 1882.—(Continued on pages 204, 205).*

LINE NUMBER.	DISEASES.	OBSERVERS BY WHOM THE SEVERAL DISEASES WERE REPORTED PRESENT.—AVERAGE PER CENTS† (PER MONTH) OF THOSE MAKING REPORTS.						
		Average 1877-82.	1882.	1881.	1880.	1879.	1878.	1877.
		42	43	45	43	44	39	38
	Average for Tabulated Diseases Reported Present.							
1	Neuralgia‡.....		85	78	79	75		
2	Rheumatism.....	83	85	84	85	85	81	78
3	Intermittent Fever.....	88	83	90	90	90	90	85
4	Bronchitis.....	75	80	74	77	75	75	71
5	Consumption, Pulmonary‡.....	74	74	78	76	78	76	61
6	Tonsillitis‡.....		72	65	67	68		
7	Diarrhea.....	63	69	67	63	65	57	58
8	Remittent Fever‡.....	68	64	66	67	69	71	68
9	Pneumonia.....	60	61	60	62	60	58	56
10	Influenza.....	54	55	48	54	57	57	54
11	Diphtheria.....	42	43	51	43	45	37	32
12	Erysipelas.....	40	42	42	45	43	35	35
13	Typho-malarial Fever‡.....	37	39	43	37	32	35	37
14	Scarlatina.....	33	32	32	26	36	38	33
15	Cholera Morbus.....	32	31	41	34	34	25	26
16	Dysentery.....	32	31	34	30	31	30	34
17	Inflammation of Bowels‡.....		28	26	25			
18	Whooping-cough.....	30	26	24	42	31	28	28
19	Typhoid Fever (enteric).....	21	24	26	21	18	16	22
20	Cholera Infantum.....	22	22	27	23	23	20	17
21	Measles.....	21	20	37	30	18	7	12
22	Puerperal Fever.....	10	18	12	8	8	6	10
23	Membranous Croup.....	15	15	19	13	16	14	14
24	Cerebro-spinal Meningitis.....	9	12	16	6	5	6	6
25	Inflammation of Brain‡.....		12	12	13			
26	Small-pox.....	3	5	4	1	1	1	5
	Number of observers.....		159	116	112	110	97	115
	Av. No. of Observers per Month....	74	*93	70	79	73	64	66

* For 1882 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit 41, page 202; the names of the observers and the number of the reports received from each are stated in Exhibit 42, pages 218-19.

† The numbers opposite the names of the diseases do not state what per cent of the whole number of observers for the year reported the disease present at some time during the year, but state (on an average for the twelve months of the year) by what per cent of the observers making reports for the several months, the disease was reported present in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the observers for that month (the number of whom is stated at the foot of the column) reported the given disease in that month.

‡ Consumption, remittent fever, and typho-malarial fever were not printed on the first blanks used in making weekly reports (beginning with the month of September, 1876); neuralgia and tonsillitis were not printed on any blanks used prior to October, 1878, and not on all used for several months after that date; inflammation of brain and inflammation of bowels were not printed on any blanks used prior to July, 1879, and not on all used for several months after that date; hence it is probable that these diseases were not so fully reported at first as were the other diseases.

TABLE 1.—CONTINUED.—Per Cents of Observers by which the several

		PER CENTS OF OBSERVERS BY WHICH DISEASES WERE REPORTED PRESENT.					
LINE NUMBER.	DISEASES.	JANUARY.*					DISEASES.
		AV. 77-82.	1882.	1881.	1880.	1879.	
		43	43	44	42	41	
1	Bronchitis.....	88	86	90	88	94	84
2	Rheumatism.....	88	86	83	95	94	88
3	Neuralgia.....	88	86	81	84	87	88
4	Tonsillitis.....	82	81	81	78	77	81
5	Pneumonia.....	82	76	86	82	91	71
6	Int. Fever.....	79	75	80	81	80	86
7	Consumption.....	75	73	79	73	80	77
8	Influenza.....	72	65	67	75	86	66
9	Remit. Fever.....	58	61	56	53	53	73
10	Diarrhea.....	44	58	44	45	36	46
11	Diphtheria.....	52	56	56	51	55	51
12	Typho-mal. F.†	33	46	30	39	22	34
13	Erysipelas.....	47	45	49	46	45	47
14	Typhoid Fever.....	20	35	20	18	9	19
15	Scarlatina.....	41	34	40	34	61	34
16	Whoop-cough.....	31	37	30	39	39	19
17	Inf. of Bowels‡	27	20	19	29	33	22
18	Mem. Croup.....	17	18	27	24	14	5
19	Measles.....	13	14	11	16	11	16
20	Dysentery.....	13	14	11	16	11	16
21	Cer.-spi. Men.†	7	13	10	2	5	7
22	Puerperal Fev.....	13	11	8	13	12	12
23	Cholera Morb.....	9	12	11	10	5	7
24	Inf. of Brain.†	4	9	3	1	0	0
25	Small-pox.....	4	9	3	1	0	0
26	Cholera Infan.....	4	4	0	5	5	5
Observers.....		76	97	70	83	64	73
		APRIL.*					DISEASES.
LINE NUMBER.		AV. 77-82.	1882.	1881.	1880.	1879.	
		42	42	47	41	46	
		42	42	47	41	46	
1	Bronchitis.....	84	90	88	80	88	79
2	Neuralgia.....	84	90	84	82	78	81
3	Rheumatism.....	87	85	93	84	95	87
4	Int. Fever.....	82	81	91	90	92	82
5	Pneumonia.....	79	81	79	86	82	73
6	Consumption.....	77	78	79	78	82	79
7	Tonsillitis.....	71	71	75	70	78	71
8	Diarrhea.....	47	65	54	41	48	40
9	Remit. Fever.....	62	64	62	61	62	62
10	Influenza.....	64	60	66	57	78	63
11	Erysipelas.....	45	45	44	52	50	30
12	Diphtheria.....	41	43	49	43	42	38
13	Scarlatina.....	38	36	46	31	47	32
14	Typho-mal. F.†	21	28	18	14	17	29
15	Dysentery.....	14	26	7	11	10	14
16	Inf. of Bowels‡	23	23	16	20	...	...
17	Measles.....	35	22	81	54	23	5
18	Whoop-cough.....	26	21	22	45	27	17
19	Cholera Morb.....	14	17	22	8	12	13
20	Cer.-spi. Men.†	12	15	34	5	10	3
21	Typhoid Fever.....	11	15	7	8	12	10
22	Inf. of Brain.†	15	15	15	12	...	...
23	Mem. Croup.....	15	14	13	13	22	16
24	Puerperal Fev.....	8	9	9	7	2	2
25	Small-pox.....	4	6	9	1	0	0
26	Cholera Infan.....	3	2	0	1	5	5
Observers.....		71	86	68	83	60	63
		MAY.*					DISEASES.
LINE NUMBER.		AV. 77-82.	1882.	1881.	1880.	1879.	
		41	43	44	40	41	
		41	43	44	40	41	
1	Neuralgia.....	91	91	81	75	69	...
2	Int. Fever.....	93	87	94	93	96	97
3	Bronchitis.....	78	85	80	74	78	78
4	Rheumatism.....	85	84	89	83	90	80
5	Consumption.....	78	79	79	79	88	80
6	Pneumonia.....	69	73	83	65	67	68
7	Tonsillitis.....	72	60	65	71	71	...
8	Remit. Fever.....	68	65	67	69	68	65
9	Diarrhea.....	53	62	54	57	49	45
10	Influenza.....	54	55	49	46	53	62
11	Erysipelas.....	48	49	40	58	51	37
12	Diphtheria.....	33	38	43	38	36	27
13	Scarlatina.....	38	37	80	49	29	8
14	Typho-mal. F.†	32	35	37	23	33	33
15	Whoop-cough.....	31	25	26	51	24	27
16	Typhoid Fever.....	20	23	24	14	15	23
17	Inf. of Bowels‡	21	20	28	...	...	...
18	Puerperal Fev.....	11	21	13	6	7	8
19	Dysentery.....	16	16	11	12	11	23
20	Inf. of Brain.†	16	16	13	15	...	...
21	Cholera Morb.....	19	16	29	16	18	13
22	Cer.-spi. Men.†	11	14	26	7	1	10
23	Typhoid Fever.....	10	13	9	7	7	10
24	Mem. Croup.....	11	13	11	7	14	10
25	Small-pox.....	5	11	7	1	1	0
26	Cholera Infan.....	6	6	10	5	1	7
Observers.....		73	95	70	81	72	60
		JUNE.*					DISEASES.
LINE NUMBER.		AV. 77-82.	1882.	1881.	1880.	1879.	
		40	41	45	46	41	
		40	41	45	46	41	
1	Rheumatism.....	83	87	86	89	86	82
2	Int. Fever.....	94	86	96	96	96	93
3	Neuralgia.....	83	83	78	81	77	...
4	Bronchitis.....	68	77	72	77	68	66
5	Consumption.....	71	74	72	73	78	70
6	Tonsillitis.....	69	64	64	64	64	...
7	Diarrhea.....	64	61	80	78	63	48
8	Remit. Fever.....	69	60	65	77	74	70
9	Pneumonia.....	49	57	54	47	47	56
10	Influenza.....	40	53	30	34	43	48
11	Erysipelas.....	40	41	42	49	49	46
12	Scarlatina.....	31	34	30	30	28	28
13	Measles.....	34	33	62	51	32	7
14	Diphtheria.....	31	33	45	32	35	23
15	Cholera Morb.....	41	38	45	57	33	30
16	Whoop-cough.....	31	26	28	51	25	25
17	Puerperal Fev.....	12	25	12	14	6	5
18	Cholera Infan.....	25	23	39	35	12	18
19	Inf. of Bowels‡	21	20	28	...	...	...
20	Typho-mal. F.†	23	21	19	30	21	25
21	Typhoid Fever.....	11	16	12	8	6	11
22	Dysentery.....	26	16	36	35	16	26
23	Inf. of Brain.†	16	16	7	12	...	...
24	Cer.-spi. Men.†	10	14	20	4	4	5
25	Mem. Croup.....	8	17	13	8	6	10
26	Small-pox.....	4	6	6	0	4	2
Observers.....		72	87	69	74	81	61

* For 1882 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit 41, page 202; the names of observers and the number of reports received from each are stated in Exhibit 42, pages 218-219.

† The numbers in this line are an average, not for all diseases represented, but only for those reported present in the given month.

‡ See foot-note with this mark on page 203.

§ The numbers in this line state how many observers reported for the month in the given year.

WEEKLY REPORTS OF DISEASES,—CALENDAR YEAR 1882.

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Diseases were Reported Present, by Months in each of the Years 1878-82.

PER CENTS OF OBSERVERS BY WHICH DISEASES WERE REPORTED PRESENT.																			
JULY.*						AUGUST.*						SEPTEMBER.*							
DISEASES.	AV. 77-82.	1882.	1881.	1880.	1879.	DISEASES.	AV. 77-82.	1882.	1881.	1880.	1879.	DISEASES.	AV. 77-82.	1882.	1881.	1880.	1879.	LINE NUMBER.	
Av. Disease...	43	41	46	47	46	Av. Disease...	45	45	48	48	48	Av. Disease...	46	48	46	49	45	1	
Int. Fever.....	94	86	97	98	96	Diarrhea.....	97	96	99	99	94	Diarrhea.....	97	95	97	99	96	98	1
Rheumatism.....	76	84	80	83	80	Int. Fever.....	94	88	97	96	95	Int. Fever.....	94	89	95	97	96	94	2
Neuralgia.....	84	69	70	76	76	Neuralgia.....	82	67	70	67	67	Neuralgia.....	80	67	69	68	68	68	3
Diarrhea.....	92	82	97	99	96	Chol. Morb.....	81	80	100	85	87	Rheumatism.....	75	77	76	78	78	73	4
Consumption.....	71	77	74	74	77	Rheumatism.....	71	79	82	75	69	Remit. Fever...	79	77	77	79	79	84	5
Remit. Fever...	74	67	71	74	80	Consumption.....	68	73	72	73	75	Bronchitis.....	61	75	53	64	63	65	6
Bronchitis.....	57	66	53	65	55	Remit. Fever...	80	69	76	80	90	Consumption.....	69	71	77	75	73	76	7
Tonsillitis.....	61	43	45	48	48	Cholera Inf.....	70	69	85	70	71	Dysentery.....	72	68	80	66	62	73	8
Chol. Morb.....	73	53	87	88	82	Bronchitis.....	52	65	49	56	53	Cholera Inf.....	60	67	71	58	57	60	9
Erysipelas.....	38	39	40	40	54	Dysentery.....	79	65	93	78	78	Chol. Morb.....	67	66	82	74	64	56	10
Dysentery.....	56	36	74	64	56	Tonsillitis.....	60	39	50	49	49	Tonsillitis.....	59	45	58	53	53	53	11
Pneumonia.....	35	36	36	34	39	Erysipelas.....	32	41	27	35	34	Typho-Mal. F.†	64	56	74	71	57	60	12
Inf. of Bowls...	32	39	36	36	36	Typho-Mal. F.†	45	39	54	54	42	Influenza.....	42	51	27	42	48	51	13
Influenza.....	31	31	19	26	35	Influenza.....	34	35	28	41	33	Diphtheria.....	37	42	47	45	36	27	14
Whoop-cough...	34	31	27	48	33	Diphtheria.....	32	33	48	31	41	Pneumonia.....	33	35	32	38	42	25	15
Measles.....	26	31	37	33	26	Whoop-cough...	33	31	28	50	27	Erysipelas.....	29	34	26	32	32	29	16
Diphtheria.....	31	31	43	36	38	Inf. of Bow...†	30	30	34	30	30	Whoop-cough...	31	30	23	48	32	32	17
Cholera Inf.....	51	28	70	66	56	Pneumonia.....	26	29	27	29	23	Inf. of Bow...†	28	26	32	32	32	32	18
Scarlatina.....	25	24	27	16	29	Typhoid Fev...†	25	24	33	28	23	Typhoid Fev...†	33	27	45	36	31	22	19
Typho-Mal. F.†	30	22	27	39	28	Scarlatina.....	23	22	27	13	23	Scarlatina.....	24	22	20	20	25	35	20
Puerp. Fev...†	9	19	9	10	9	Puerp. Fev...†	9	17	13	8	2	Puerp. Fev...†	10	19	11	8	9	5	21
Typhoid Fev...†	14	15	21	18	12	Inf. of Brain...†	14	14	21	16	16	Cer.-spi. Men...	8	13	12	8	2	6	22
Cer.-spi. Men...	6	6	16	5	5	Cer.-spi. Men...	8	13	12	10	7	Inf. of Brain...†	9	11	12	16	16	16	23
Mem. Croup.....	4	6	9	3	1	Measles.....	14	12	28	16	8	Mem. Croup.....	9	11	12	8	9	5	24
Small-pox.....	1	5	4	0	0	Mem. Croup.....	6	7	9	6	5	Measles.....	9	6	11	13	14	3	25
Inf. of Brain...†	5	19	10	10	10	Small-pox.....	2	3	1	0	0	Small-pox.....	2	0	2	0	0	2	26
Observers.....	72	88	70	80	82	Observers.....	76	101	67	80	83	Observers.....	74	96	66	77	81	63	
OCTOBER.*						NOVEMBER.*						DECEMBER.*							
DISEASES.	AV. 77-82.	1882.	1881.	1880.	1879.	DISEASES.	AV. 77-82.	1882.	1881.	1880.	1879.	DISEASES.	AV. 77-82.	1882.	1881.	1880.	1879.	LINE NUMBER.	
Av. Disease...	46	46	45	44	49	Av. Disease...	42	45	45	40	44	Av. Disease...	43	40	42	43	46	41	1
Int. Fever.....	93	88	94	96	91	Neuralgia.....	94	81	77	78	78	Rheumatism.....	86	90	82	88	88	87	1
Diarrhea.....	80	87	85	72	86	Rheumatism.....	85	88	84	84	84	Neuralgia.....	88	81	84	80	80	80	2
Rheumatism.....	84	85	80	82	89	Bronchitis.....	81	85	80	80	75	Tonsillitis.....	83	83	83	84	80	80	3
Neuralgia.....	80	72	80	82	82	Int. Fever.....	89	85	96	89	86	Bronchitis.....	86	82	82	83	92	85	4
Bronchitis.....	72	79	54	75	75	Tonsillitis.....	82	77	73	70	70	Int. Fever.....	80	71	82	83	81	80	5
Remit. Fever...	79	74	75	74	80	Consumption.....	75	72	81	75	74	Consumption.....	75	70	74	77	76	77	6
Consumption.....	76	73	78	74	78	Remit. Fever...	69	67	73	61	64	Pneumonia.....	72	67	65	77	75	77	7
Tonsillitis.....	73	52	64	72	72	Influenza.....	58	65	53	65	49	Influenza.....	62	58	59	59	68	67	8
Typho-Mal. F.†	69	69	77	67	57	Pneumonia.....	61	65	59	64	62	Remit. Fever...	62	58	59	64	67	54	9
Influenza.....	48	55	28	47	42	Diarrhea.....	55	64	56	48	59	Diarrhea.....	42	48	45	42	49	36	10
Diphtheria.....	50	48	55	51	57	Typho-Mal. F.†	51	57	76	39	42	Diphtheria.....	52	46	56	57	60	54	11
Dysentery.....	46	48	57	30	41	Diphtheria.....	52	47	61	53	55	Erysipelas.....	41	40	53	52	39	34	12
Erysipelas.....	38	44	35	41	30	Typhoid Fev...†	34	41	46	31	30	Typho-Mal. F.†	39	37	60	32	35	28	13
Pneumonia.....	41	44	32	41	37	Erysipelas.....	37	39	40	44	36	Inf. of Bow...†	33	24	16	16	16	16	14
Chol. Morb.....	32	35	45	25	38	Scarlatina.....	31	31	20	28	32	Scarlatina.....	36	32	32	38	37	51	15
Cholera Inf.....	26	34	35	16	19	Inf. of Bow...†	31	30	17	17	17	Typhoid Fev...†	27	24	36	25	31	16	16
Inf. of Bow...†	34	25	17	17	17	Dysentery.....	21	30	21	15	23	Whoop-cough...	28	23	18	28	39	41	17
Typhoid Fev...†	37	33	52	33	35	Whoop-cough...	30	26	24	29	34	Measles.....	14	18	9	19	20	18	18
Scarlatina.....	30	32	15	20	35	Mem. Croup.....	21	22	24	17	19	Mem. Croup.....	24	17	25	26	32	25	19
Whoop-cough...	29	23	18	32	32	Puerp. Fev...†	11	20	13	8	8	Chol. Morb.....	12	15	11	17	11	8	20
Puerp. Fev...†	11	22	11	9	11	Chol. Morb.....	14	16	23	13	8	Puerp. Fev...†	8	13	16	4	7	3	21
Mem. Croup.....	15	21	15	14	11	Measles.....	10	14	6	13	12	Dysentery.....	13	12	8	10	23	11	22
Inf. of Brain...†	11	8	16	16	16	Cholera Inf.....	9	11	13	8	10	Inf. of Brain...†	11	8	7	7	7	7	23
Measles.....	7	8	8	11	10	Inf. of Brain...†	11	10	9	9	9	Cer.-spi. Men...	7	6	14	4	5	5	24
Cer.-spi. Men...	10	8	17	9	6	Cer.-spi. Men...	6	11	14	4	0	Cholera Inf.....	7	5	2	6	5	2	25
Small-pox.....	1	2	0	0	0	Small-pox.....	2	2	6	1	1	Small-pox.....	3	2	10	0	3	0	26
Observers.....	76	91	65	76	79	Observers.....	74	88	70	75	73	Observers.....	76	84	88	69	75	61	

* †, ‡ See notes with these marks, on page 204.
 ‡ For this foot-note see page 203.

TABLE 2.—WEEKLY REPORTS OF DISEASES IN MICHIGAN IN 1882.—Exhibiting for the Year and for Each Month of the Year Ending Saturday, December 30, 1882, a Summary relative to Diseases in the State of Michigan; also for each Month a Summary relative to Diseases in each of 10 Geographical Divisions* of the State,—Indicating the Prevalence as regards Time and Area, and also the Comparative Severity of the Diseases. Compiled from 4,745 Weekly Reports by 159 Observers, Health Officers of Cities and Villages, and Regular Correspondents of the State Board of Health.

NUMBER OF OBSERVERS, REPORTS, ETC.	DISEASES.	YEAR ENDING DECEMBER 30, 1882.																
		Average number of Localities repre- sented, 122. Whole number of Observers during the year, 159. Total number of reports compiled, 4,745. per month, 393. per month, 93.																
(A, B) Per Cent of Observers Report- ing Presence of.	A, V. Per Cent of Weeks Reported Present Where	Per Cent of Reports Scaling Presence	Average Order of Prevalence Where Present.	Times Reported More than Usually Severe.	Times Reported Us- ually Severe.	Times Reported Less than Usually Se- vere.	Difference between "Times more" and "Times less" than Usually Severe.	A, V. Times per Month Reported More than Usually Severe.	A, V. Times per Month Reported Less than Usually Severe.	A, V. Difference betw- "Times More" and "Times Less" Se- vere.	AVERAGE ORDER OF PREVA- LENCE WHERE PRESENT.*							
43	69	30	4.2	146.8	703.3	293.7	-147.0	12.2	58.6	94.5	1881.	1880.	1879.	1878.	1877.	Av. 177-82.		
12	40	5	6.6	60	63	68	-8	5.0	6.3	5.7	8.7	8.1	---	---	---	---		
28	48	13	6.0	120	268	126	-6	10.0	22.4	10.5	7.4	7.0	---	---	---	---		
80	81	65	3.3	253	1,082	598	-345	21.1	140.2	49.8	3.9	3.7	3.6	3.3	2.3	3.4		
12	51	6	7.2	58	75	94	-36	4.8	6.3	7.8	7.9	7.1	7.4	5.9	6.0	6.9		
22	55	12	4.9	80	232	127	-47	6.7	19.3	10.6	5.1	5.2	5.4	5.7	4.9	5.2		
31	54	17	5.2	84	378	155	-71	7.0	31.5	12.9	5.3	5.3	5.3	5.7	4.	5.3		
74	88	66	4.6	212	2,140	112	+100	17.7	178.3	9.3	5.6	5.7	5.6	5.2	5.1	5.3		
15	46	7	7.0	63	114	73	-10	5.3	9.5	6.1	8.2	7.4	6.6	7.1	6.	7.1		
43	58	25	4.8	189	459	305	-116	15.8	33.3	25.4	-0.7	5.6	5.7	5.4	5.4	5.4		
69	70	48	3.8	187	1,138	561	-374	15.6	94.4	40.8	3.9	4.2	4.1	4.2	3.8	4.1		
31	56	17	5.3	107	336	227	-120	8.9	28.0	18.9	5.1	5.8	6.2	5.9	4.9	5.5		
42	53	22	5.5	132	413	254	-122	11.0	34.4	21.2	6.2	6.3	6.5	6.4	5.8	6.1		
83	85	71	2.0	194	1,800	759	-565	10.2	150.0	63.3	2.4	2.3	2.2	2.1	2.2	2.2		
64	75	48	3.3	187	1,074	507	-320	15.6	89.5	42.3	3.5	3.3	3.3	3.1	3.	3.3		
24	60	14	5.1	143	296	133	-10	11.9	24.8	12.8	6.2	6.5	7.0	7.0	5.5	6.2		
39	63	34	4.9	147	556	231	-84	12.3	40.3	19.3	5.2	5.5	5.8	5.4	4.7	5.3		

represented, 132.

Whole number of
Observers during the year, 159.

Average number of Localities re-
ported, 159.

Total number of reports compiled, 4,745.

FOR THE		Whole number of Localities sent per month, &c.		Average No. of Reports															
		55	73	40	3.1	161	976	381	-220	13.4	81.3	318	-18.3	3.5	3.0	3.	3.0	3.1	
Infuenza.....	20	56	11	4.9	80	219	117	117	-37	6.7	18.3	9.8	-3.1	4.4	4.8	4.7	5.3	5.0	4.9
Measles.....	85	79	68	3.6	353	1,590	611	611	-258	23.4	132.5	50.9	-21.5	4.3	4.5	4.5	....	....	....
Neuralgia.....	61	64	39	4.4	273	879	353	353	-80	22.8	73.3	29.4	-6.6	5.4	5.	5.2	4.8	4.0	4.8
Pneumonia.....	18	40	7	6.2	76	107	93	93	-17	6.3	8.9	7.8	-1.4	8.2	.8	7.2	6.3	6.1	7.0
Puerperal Fever.....	85	80	68	3.8	252	1,580	772	772	-320	21.0	131.7	64.3	-43.3	4.6	6	4.6	4.2	4.0	4.3
Rheumatism.....	32	55	18	4.9	104	320	247	247	-143	8.7	26.7	20.6	-11.9	6.7	5	5.5	5.4	4.8	5.6
Scarlatina.....	5	66	3	9.1	18	65	39	39	-41	1.5	5.4	4.9	-3.4	8.9	6.3	10.6	3.9	6.8	7.6
Small-pox.....	72	67	48	3.9	233	1,113	455	455	-222	19.4	92.8	37.9	-18.5	4.5	4.4	4.5	....	....	....
Tonsillitis.....	26	65	17	4.4	50	414	199	199	-149	4.2	34.5	16.6	-12.4	6.3	4.8	5.5	4.7	4.8	5.1
Whooping-cough.....																			

* For Counties in each Division, see Exhibit 1, page 5; also a map on page 113.

† For number of Observers, reports, weeks in each month, etc., see Exhibit 41, page 202; for names of observers and number of reports received from each see Exhibit 42, pages 218-19.

a Not every one of the observers sent in a report for every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks.

b The numbers in this column (pages 206-7) state not what per cent of the whole number of observers for the year reported the disease present at some time during the year, but the average (for the twelve months) of the per cents of observers making reports for the several months) by which the disease was reported present in those months. The column for the year is thus a statement for an average month. But on pages 208-11 the numbers in the "Per Cent of Observers" column are statements for the months, and not averages. This column indicates the Area of Prevalence, except that in a few instances there were two or more observers in one city or village.

c This column states, for the year or given month, what per cent the number of reports which stated a disease to be present is of the number of cards-reports received, for the given time, from such of the observers as reported the disease present. It is therefore an average not for all localities represented, but only for those at which the given disease was reported present. In the line "Average for Tabulated Diseases," it states what per cent the number of times *all* diseases were reported present is of the number of times they *might* have been so reported on the cards received, for the time specified from the observers who during that time reported the diseases present (that is, if each of the observers had on every card he sent reported every disease present which he reported present at all). It will be seen that this is a more accurate average than would be obtained by dividing the sum of the column by the number of diseases reported present.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from *all* observers in the State or division, as the case may be. It combines, and states in a general way, an idea of the *time* a disease was prevalent, with an idea of the area of its prevalence. Had every observer sent a report every week of the month or year, the numbers in this column would be (for the State) the product of the numbers in the same line in the two preceding columns.

e The disease having the greatest number of cases was to be marked 1 in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals (for the State) of the Order of Prevalence column, in Table 3 (a table giving statements for each locality, omitted in printing this Report, for want of room), by the number of men who reported the disease present. The column is, therefore, an average not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines of this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of men who reported the difference of the diseases present, thus counting each man once for every disease he reported present. As a rule, small numbers in this column indicate a large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer from week to week, the greater will be the "average" in this column.

f The + sign indicates that the times reported "more" exceed those reported "less" than usually severe. The - sign, that the times reported "less" exceed those reported "more" than usually severe, the number of times by which either exceeds the other being indicated by the numbers stated.

g In this statement Jackson and the State Prison at Jackson are counted as separate localities.

	9	72	7	6.6	4	6	11	- 7	9	56	2	9.0	2	6	8	9	- 7	6	32	3	9.3	2	9	1	- 5
Small-pox.....	42	71	30	4.4	10.2	32.0	20.0	- 9.7	43	68	20	4.3	14.6	68.0	28.1	- 13.5	41	69	28	4.1	9.5	47.1	23.1	- 13.6	
Av. for Tab. Dis. Rep. Pres.																									
Brain, Inflammation of.....	15	43	7	8.5	9	4	5	+ 4	16	41	6	6.7	6	13	6	0	16	36	6	5.5	8	2	5	+ 3	
Bowels, Inflam. of.....	23	50	12	7.6	7	20	11	- 4	21	46	9	7.2	9	17	11	- 2	21	66	14	5.6	5	20	10	- 5	
Bronchitis.....	90	83	74	3.0	16	150	40	- 24	85	82	70	2.9	21	189	54	- 33	77	81	62	3.3	14	116	55	- 41	
Cerebro-spi. Meningitis.....	15	59	9	7.7	7	8	5	+ 2	14	56	7	8.2	10	13	8	+ 2	14	57	8	7.4	9	5	10	- 1	
Cholera Infantum.....	2	38	1	12.5	0	2	1	- 1	6	32	2	9.2	1	7	4	- 3	22	39	9	5.0	5	10	11	- 6	
Cholera Morbus.....	17	46	8	7.9	3	12	5	- 2	16	34	5	6.9	7	4	7	0	28	45	13	5.8	2	26	6	- 4	
Consumption, Pulm'ry.....	78	84	66	5.1	16	157	3	+ 13	79	88	69	4.4	31	223	11	+ 20	74	90	66	4.1	15	154	11	+ 4	
Croup, Membranous.....	14	47	7	8.3	5	10	2	+ 3	13	45	6	7.4	9	5	9	0	7	54	4	8.7	0	6	6	- 6	
Diphtheria.....	43	59	26	4.9	16	33	21	- 5	38	57	22	5.6	9	43	31	- 22	33	50	17	5.6	12	26	13	- 1	
Diarrhea.....	65	63	41	4.6	13	67	33	- 20	62	63	39	4.7	16	104	37	- 21	61	75	45	3.9	11	71	50	- 39	
Dysentery.....	26	51	13	6.0	6	20	11	- 5	16	49	7	6.8	4	12	14	- 10	16	55	9	5.9	3	9	11	- 8	
Erysipelas.....	45	54	25	5.6	9	41	14	- 5	49	48	23	5.4	16	47	25	- 9	41	53	22	4.4	6	33	17	- 11	
Fever, Intermittent.....	81	84	68	2.5	18	124	48	- 30	87	87	76	2.1	21	181	89	- 68	86	88	76	1.7	12	151	62	- 50	
Fever, Remittent.....	64	69	44	3.4	13	69	34	- 21	65	76	49	3.4	21	111	54	- 33	60	73	44	3.2	8	69	40	- 32	
Fever, Typhoid (enteric).....	15	56	8	5.4	7	15	9	- 2	13	53	7	5.6	6	14	8	- 2	16	57	9	4.6	14	12	5	+ 9	
Fever, Typho-malarial.....	28	63	18	5.4	8	27	11	- 3	23	61	15	5.9	12	31	15	- 3	21	63	13	6.4	5	18	16	- 11	
Influenza.....	60	78	47	2.6	8	82	39	- 31	55	74	40	2.9	12	97	39	- 27	53	63	33	3.5	7	47	41	- 34	
Measles.....	22	60	13	5.0	5	27	6	- 1	37	57	21	4.5	22	35	19	+ 3	33	63	21	4.3	10	38	16	- 6	
Neuralgia.....	90	82	73	3.4	28	116	47	- 19	91	78	71	3.4	32	163	69	- 37	83	84	69	3.4	24	112	47	- 23	
Pneumonia.....	81	73	58	4.2	29	95	32	- 3	73	63	46	4.6	31	106	45	- 14	57	50	34	4.3	24	54	23	+ 1	
Puerperal Fever.....	9	41	4	6.4	2	2	5	- 3	21	44	9	5.5	19	8	9	+ 10	25	39	10	5.7	13	9	7	+ 6	
Rheumatism.....	85	84	71	3.8	16	126	55	- 39	84	78	65	3.6	28	162	63	- 35	87	79	69	3.5	14	113	63	- 49	
Scarlatina.....	36	53	19	6.0	5	33	16	- 11	35	44	15	4.9	7	35	19	- 12	34	63	22	4.9	9	26	22	- 13	
Small-pox.....	6	89	5	11.2	2	7	- 8	- 6	11	63	7	8.9	2	16	8	- 6	6	80	5	10.4	1	7	6	- 5	
Tonsillitis.....	71	74	52	3.7	13	87	44	- 31	72	67	47	3.9	21	103	54	- 33	69	62	43	3.7	13	70	31	- 18	
Whooping-cough.....	21	72	15	5.3	5	19	14	- 9	25	55	14	4.4	6	30	23	- 17	26	55	15	4.5	2	21	16	- 14	

Amoy

TABLE 2.—CONTINUED.—Diseases in the State,—July to December, 1882. (For foot-notes and full tabular heads, see pages 206-207.)

DISEASES.	JULY.										AUGUST.										SEPTEMBER.												
	Per ct. of Observers	Av. per ct. of Weeks	Reported Present	Where Present, a.c.	Per ct. of Reports	Stating Pres. of, d	Av. Order of Pres. e	Times Reported More	Times Reported Usually Severe.	Times Reported Less than usually severe.	Difference between Times "More" and "Less" Severe. f	Per ct. of Observers	Av. per ct. of Weeks	Reported Present	Where Present, a.c.	Per ct. of Reports	Stating Pres. of, d	Av. Order of Pres. e	Times Reported More	Times Reported Usually Severe.	Times Reported Less than usually severe.	Difference between Times "More" and "Less" Severe. f	Per ct. of Observers	Av. per ct. of Weeks	Reported Present	Where Present, a.c.	Per ct. of Reports	Stating Pres. of, d	Av. Order of Pres. e	Times Reported More	Times Reported Usually Severe.	Times Reported Less than usually severe.	Difference between Times "More" and "Less" Severe. f
Av. for Tab. Dis. Rept. Pres.	41	68	28	4.2	9.5	43.9	24.4	-14.9				45	68	30	4.2	14.3	71.1	31.5	-17.2				48	70	34	4.3	12.2	58.8	27.1	-14.9			
Brain, Inflammation of.	5	60	3	9.3	4	0	4	0				14	35	5	5.9	2	9	7	-5				11	51	6	6.5	3	4	5	-2			
Bowels, Inflammation of	32	42	13	4.9	13	10	3	3				30	43	13	5.9	12	31	12	0				28	50	14	5.5	12	8	4	4			
Bronchitis.....	66	78	51	3.7	14	83	55	-41				65	68	44	4.5	10	96	69	-59				75	76	57	4.2	17	102	49	-32			
Cerebro-spi. Meningitis	6	75	4	8.6	1	2	12	-11				13	44	6	7.9	4	9	13	-9				13	52	7	6.6	5	2	9	-4			
Cholera Infantum.....	28	59	17	5.0	8	20	15	-7				69	60	41	3.8	34	96	30	4				67	60	40	4.2	23	63	27	-4			
Cholera Morbus.....	53	59	32	4.4	18	50	19	-1				80	65	52	3.9	29	127	50	-21				66	58	38	4.3	10	68	36	-26			
Consumption, Pulmon'y	77	87	67	4.2	13	157	13	0				73	85	63	4.3	17	197	18	-1				71	89	63	4.7	14	145	15	-1			
Croup, Membranous....	6	55	3	9.0	4	1	4	0				7	41	3	8.7	1	7	8	-7				11	43	5	7.3	4	4	6	-2			
Diphtheria.....	31	51	16	5.9	10	24	14	-4				33	42	14	5.0	15	29	19	-4				42	55	23	4.7	16	35	24	-8			
Diarrhea.....	82	73	60	2.8	19	103	52	-33				96	81	78	2.3	35	193	83	-48				95	84	80	2.7	18	154	64	-46			
Dysentery.....	36	57	21	5.4	13	24	23	-10				65	61	40	4.4	28	82	48	-20				68	62	42	4.6	18	70	43	-25			
Erysipelas.....	39	54	21	5.4	11	22	23	-12				41	46	19	6.1	8	36	22	-14				34	53	18	6.0	6	19	22	-16			
Fever, Intermittent.....	86	89	77	1.7	12	143	72	-60				88	91	80	1.6	28	226	71	-43				89	92	82	1.8	18	176	53	-35			
Fever, Remittent.....	67	70	47	3.1	7	79	40	-33				69	79	55	3.5	22	129	68	-36				77	79	61	3.3	26	105	37	-11			
Fever, typhoid (enteric)	15	59	8	6.4	6	8	4	2				24	45	11	5.6	7	23	16	-9				27	65	17	6.0	11	34	12	-1			
Fever, typho-malarial.	22	64	14	5.9	2	15	16	-14				39	55	21	4.8	16	58	13	3				56	71	40	4.3	26	63	26	0			
Influenza.....	31	68	21	5.1	5	39	20	-15				35	53	19	4.4	8	33	26	-18				51	65	33	3.5	13	56	27	-14			
Measles.....	31	57	17	4.0	10	22	13	-3				13	50	6	5.3	5	9	13	-8				6	43	3	8.0	0	1	5	-5			
Neuralgia.....	84	76	64	3.7	25	97	59	-34				82	74	61	3.8	31	139	65	-34				80	79	64	4.3	25	101	50	-25			
Pneumonia.....	36	48	17	5.5	12	26	11	1				20	41	12	5.6	5	32	12	-7				35	53	19	5.5	6	29	13	-7			
Puerperal Fever.....	19	51	10	6.0	8	14	8	0				17	30	5	7.3	3	12	10	-7				19	39	7	6.7	5	7	10	-5			
Rheumatism.....	84	79	66	3.7	16	103	70	-54				79	77	61	4.2	25	135	76	-51				77	81	62	4.5	19	105	67	-55			
Scarlatina.....	94	90	14	5.3	7	30	16	-9				22	46	10	6.0	10	14	20	-10				23	56	13	4.6	5	14	15	-10			

	5	94	4	108	2	4	5	-3	3	47	1	120	1	7	2	-1	0	o	o	o	o	o	0	0
Small-pox.....	61	57	35	4.5	7	54	33	-26	60	53	31	4.9	13	66	39	-26	59	62	37	4.8	12	47	40	-28
Tonsillitis.....	31	63	19	4.6	1	28	24	-23	31	64	20	3.9	3	54	18	-15	30	67	20	4.2	1	46	15	-14
Whooping-cough.....	46	69	32	4.2	10.4	38.3	22.5	-12.0	45	68	31	4.1	13.3	65.6	27.7	-14.4	40	73	29	4.0	10.5	50.8	18.3	-7.8
Av. for Tab. Dis. Rept. Pres.	11	38	4	6.2	4	5	4	0	11	40	4	6.4	5	3	12	-7	11	47	5	6.2	6	3	4	+
Brain, Inflammation of.	34	47	16	5.3	7	92	7	0	31	45	14	6.7	8	28	15	-7	33	47	16	5.9	6	25	9	-3
Bowels, Inflammation of	79	74	59	3.6	19	117	48	-29	85	84	71	3.1	37	156	55	-18	82	86	71	2.6	27	133	40	-13
Bronchitis.....	8	41	3	8.3	1	2	5	-4	11	36	4	7.3	4	3	6	-2	6	50	3	9.0	1	1	6	-5
Cerebro-spi. Meningitis	34	58	20	5.0	6	20	23	-17	11	46	5	7.9	2	6	10	-8	5	31	1	4.0	0	2	1	-1
Cholera Infantum.....	35	48	17	5.3	3	39	11	-8	16	44	7	6.6	0	12	9	-9	15	35	5	6.1	2	8	3	-1
Cholera Morbus.....	73	90	65	4.6	8	166	0	+ 8	72	88	63	4.7	20	194	3	+17	70	93	63	4.3	12	150	5	+ 7
Consumption, Pulmon'y	21	41	9	6.2	5	11	5	0	22	50	10	6.8	7	16	8	-1	17	54	9	7.1	5	10	3	+ 2
Croup, Membranous....	48	59	28	4.3	9	44	27	-18	47	61	28	4.3	19	50	38	-19	46	60	28	4.7	26	34	23	+ 3
Diphtheria.....	87	76	66	3.3	18	118	57	-39	64	63	40	4.5	10	90	49	-39	48	57	29	4.7	8	48	21	-13
Diarrhea.....	48	58	28	4.5	13	44	22	-9	30	48	14	5.1	7	20	20	-13	12	65	8	6.6	3	9	7	-4
Dysentery.....	44	58	26	5.4	12	31	21	-9	39	60	23	6.1	10	47	25	-15	40	59	24	5.6	15	29	17	-2
Erysipelas.....	88	51	80	1.7	18	159	52	-34	85	80	69	1.9	8	159	68	-60	71	86	61	2.4	5	102	53	-48
Fever, Intermitent....	74	81	60	2.8	20	111	42	-22	67	76	51	2.9	21	100	55	-34	58	72	42	3.3	12	75	26	-14
Fever, Remittent.....	33	70	23	5.3	7	41	16	-9	41	56	23	4.9	18	40	25	-7	24	69	16	4.5	20	13	14	+ 6
Fever, typhoid (enteric)	69	68	47	4.2	19	92	26	-7	57	66	37	4.5	14	81	38	-24	37	63	23	4.6	5	45	17	-12
Fever, Typho-malarial.	55	73	40	3.8	10	77	27	-17	65	68	44	3.1	20	102	34	-14	58	80	52	2.5	11	107	31	-20
Influenza.....	8	46	4	8.0	4	3	5	-1	14	48	7	6.3	3	12	8	-5	18	53	10	4.5	1	15	6	-5
Measles.....	80	80	64	4.1	25	106	46	-20	94	79	74	3.4	39	172	47	-8	88	81	72	3.2	26	126	41	-15
Neuralgia.....	44	55	25	5.2	7	41	20	-13	65	51	33	4.7	17	65	29	-12	67	71	47	4.3	20	88	24	-4
Pneumonia.....	22	38	8	6.5	4	10	4	0	20	46	10	6.4	3	14	11	-8	13	39	5	6.5	0	4	5	-5
Puerperal Fever.....	85	83	70	4.1	23	119	56	-33	86	81	71	3.7	33	136	75	-42	90	82	74	3.7	14	138	55	-41
Rheumatism.....	32	48	15	4.4	7	22	16	-9	31	60	19	4.1	4	37	23	-19	32	56	18	4.6	7	25	17	-10
Scarlatina.....	2	75	2	2.0	1	3	2	-1	2	70	2	9.0	0	4	0	0	2	25	1	6.0	1	0	1	0
Small-pox.....	73	62	45	4.0	19	82	33	-14	82	66	54	3.6	29	117	41	-12	83	78	65	3.4	37	102	34	+ 3
Tonsillitis.....	23	68	16	4.3	1	31	9	-8	26	61	16	4.3	7	41	15	-8	23	59	13	5.2	2	19	12	-10
Whooping-cough.....																								

TABLE 2.—CONTINUED.—Diseases in the U. P., the N., the W., and the B. & E. Divisions* of the State, for the Years 1877-82, and by Month in 1882.—Indicating What Per Cent of the Weekly Reports received stated Presence of the Diseases Named.† (Statements for the N. W. and the N. C. Divisions are on page 216.)

DIV.*	DISEASES.	77-82†	1882†	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	DIV.*	77-82†	1882†	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		
	Av. for Tab. Dis. Rep. Pr.	31	25	36	39	33	50	34	39	41	37	49	41	37	38			28	69	96	88	88	75	83	81	42	53	47	44	50		
	Brain, Inflamm. of.....	† 3	4	0	0	8	0	0	0	0	11	0	0	0	10			4	0	0	0	0	0	0	0	0	0	25	10	0		
	Bowels, Inflamm. of.....	† 24	14	8	25	8	27	6	0	8	0	13	71	13	25			1	0	0	0	0	0	25	0	0	0	0	0	0		
	Bronchitis.....	69	83	83	92	77	100	94	93	100	63	88	43	81	80			78	100	100	100	100	100	100	100	60	75	50	80	50		
	Cerebro-spi. Men.....	2	4	0	0	0	0	6	20	0	5	0	0	0	10			5	0	0	0	0	60	33	0	0	0	0	0	0		
	Cholera Infantum.....	15	13	0	0	0	0	6	20	33	47	50	0	0	0			3	0	0	0	0	20	0	0	10	0	0	0	0		
	Cholera Morbus.....	20	12	0	0	0	0	6	0	33	63	25	0	0	0			5	0	0	0	0	0	0	0	20	13	0	0	0		
	Consumption, Pulm.....	77	87	83	100	92	91	71	73	67	79	100	100	100	100			12	0	0	0	0	40	100	50	20	0	0	0	0		
	Croup, Membranous.....	6	4	8	8	8	0	0	0	0	0	0	0	0	15			3	0	0	0	0	0	0	0	0	0	20	0	0		
	Diphtheria.....	4	9	33	33	23	0	0	0	0	0	0	0	0	20			11	0	0	0	0	0	0	0	10	25	0	30	25		
	Diarrhea.....	62	54	42	25	31	55	88	53	75	68	88	57	37	40			81	50	100	60	100	100	100	100	100	100	88	70	25		
	Dysentery.....	28	12	0	0	0	0	0	0	42	32	25	29	25	0			59	25	100	100	100	100	33	75	100	75	38	10	0	0	
	Erysipelas.....	28	18	8	17	23	18	24	13	17	42	0	14	0	20			5	0	0	0	0	0	0	0	10	38	0	0	0	0	
	Fever, Intermittent.....	7	12	17	0	0	0	0	33	33	26	25	29	0	0			18	0	0	0	0	0	0	0	40	38	25	40	0	0	
	Fever, Remittent.....	20	17	50	25	15	18	0	7	0	21	63	14	13	10			10	0	0	0	50	0	0	0	10	50	0	0	0	0	
	Fever, Typhoid (enteric).....	32	46	67	8	31	45	35	0	17	37	75	57	88	85			5	0	0	0	0	0	0	0	0	0	0	0	50	0	
	Fever, Typho-mal.....	6	6	8	0	15	0	0	0	0	21	13	14	0	0			26	0	0	0	0	0	0	0	10	63	88	60	0	0	
	Influenza.....	54	23	42	33	38	36	24	20	0	0	25	0	13	40			70	100	100	100	100	100	100	50	50	50	50	50	50	50	
	Measles.....	24	14	42	33	15	0	6	0	8	16	0	43	6	10			19	0	0	80	50	40	0	0	50	13	0	0	0	0	
	Neuralgia.....	† 55	62	33	83	69	64	59	87	100	47	63	14	56	60			78	100	100	100	100	100	100	100	60	50	63	50	100	100	
	Pneumonia.....	43	29	50	42	31	45	24	73	8	0	0	0	13	45			30	50	75	60	0	0	0	0	30	75	38	0	25	0	
	Puerperal Fever.....	4	4	8	25	8	0	0	7	0	0	13	0	0	0			8	0	0	0	0	60	0	0	0	0	25	10	0	0	
	Rheumatism.....	67	50	42	58	92	45	29	60	42	26	50	57	37	70			99	100	100	100	100	100	100	100	100	100	88	100	100	100	
	Scarlatina.....	38	10	25	0	8	0	0	13	0	0	23	14	13	25			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Small-pox.....	1	6	26	25	15	0	0	0	0	11	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

UPPER-PENINSULAR DIVISION.*

Tonsillitis.....	43	48	42	33	62	55	59	40	25	53	88	57	31	50	----	21	25	0	0	0	0	0	0	40	25	25	40	25	0
Whooping-cough.....	25	11	33	33	23	----	0	7	0	26	0	0	0	5	----	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Av. for Tab. Dis. Rep. Pr.	35	33	37	34	34	42	39	49	33	32	37	38	37	39		35	39	38	34	40	37	34	36	41	40	37	36		
Brain, Inflamm. of.....	+ 6	4	0	3	0	19	23	0	0	3	3	0	0	0		+ 5	5	4	8	6	14	0	4	0	9	11	5	2	2
Bowels, Inflamm. of.....	+ 16	17	6	6	5	22	23	0	16	24	24	26	27	19		+ 17	21	31	17	16	22	14	31	18	22	18	21	15	30
Bronchitis.....	58	62	66	64	64	85	83	53	21	42	53	66	69	59		75	75	73	79	86	78	75	65	57	64	70	96	82	
Cerebro-spinal Men.....	4	5	13	0	5	11	17	0	0	3	0	0	7	0		5	8	10	23	14	18	2	12	4	4	2	2	2	2
Cholera Infantum.....	17	13	0	0	5	0	3	0	0	45	41	29	7	4		18	21	2	6	7	0	0	15	39	65	70	30	2	5
Cholera Morbus.....	23	17	16	11	12	15	17	0	16	39	32	29	2	7		21	22	10	15	14	16	5	17	29	70	46	19	4	5
Consumption, Pul.....	50	56	75	67	71	52	53	40	42	42	35	51	60	63		72	77	94	79	80	82	71	73	80	74	71	70	70	75
Croup, Membranous.....	8	13	13	25	21	22	30	0	0	3	6	11	13	4		11	11	25	10	11	16	0	6	4	4	9	14	19	18
Diphtheria.....	38	27	31	33	38	26	23	27	16	11	21	31	31	30		35	29	60	37	19	31	21	15	14	10	39	35	46	39
Diarrhea.....	47	48	44	33	38	44	57	0	53	63	74	74	42	33		51	55	48	46	31	55	43	63	61	89	80	72	50	30
Dysentery.....	29	30	22	11	19	30	30	0	32	71	65	37	18	7		21	21	12	10	4	16	5	17	31	55	52	33	9	9
Erysipelas.....	32	27	25	17	21	41	30	40	32	11	21	29	44	30		25	22	23	19	26	35	22	12	14	14	23	28	24	30
Fever, Intermittent.....	78	74	69	50	48	78	80	93	80	92	97	83	76	48		88	82	75	77	79	76	81	83	84	87	93	95	80	77
Fever, Remittent.....	73	56	41	31	31	52	63	73	79	55	71	86	71	41		54	51	35	48	53	51	55	48	51	49	59	63	57	45
Fever, Typh. (Ent'c). ..	14	20	13	28	24	22	23	0	47	21	15	23	22	0		8	10	12	4	3	0	0	6	6	12	20	19	20	20
Fever, Typho mal.....	29	41	50	36	36	30	33	13	32	42	44	57	44	59		33	35	38	46	23	27	17	23	25	28	50	46	56	34
Influenza.....	51	48	63	75	67	70	53	53	11	5	29	29	49	67		45	44	56	48	51	49	48	44	29	22	34	56	46	50
Measles.....	13	8	16	6	10	0	27	13	26	0	0	3	2	7		15	8	13	23	11	8	14	15	4	1	0	0	4	0
Neuralgia.....	+ 75	67	66	58	69	74	80	67	47	42	59	66	82	85		+ 72	75	83	83	79	73	69	75	75	72	66	67	87	77
Pneumonia.....	47	51	75	67	67	74	67	0	16	18	41	34	49	74		49	41	71	73	66	67	62	42	24	14	11	14	22	25
Puerperal Fever.....	8	14	9	19	21	4	29	33	26	11	15	6	9	4		5	10	8	4	4	2	17	13	16	12	9	16	6	11
Rheumatism.....	62	61	47	44	62	52	70	87	47	55	47	71	76	81		77	76	87	83	71	73	67	71	76	71	79	79	80	80
Scarlatina.....	29	27	47	47	45	41	27	67	21	0	9	6	13	22		21	25	23	38	36	25	28	29	16	9	23	26	18	18
Small-pox.....	1	7	13	11	2	0	3	27	16	0	0	11	9	0		2	3	15	6	0	0	14	0	0	0	0	0	0	0
Tonsillitis.....	+ 61	53	59	61	69	59	50	53	37	18	24	37	82	93		+ 57	64	79	81	66	69	69	61	42	38	58	76	80	80
Whooping-cough.....	20	11	6	11	7	0	0	0	5	11	26	14	13	22		24	13	15	19	11	16	3	10	22	9	16	14	17	14

* t. d. See page 207.
† For inflam. of brain, and inflam. of bowels, an average for the 3 years 1880-2; for neuralgia and tonallitis, an av. for the 4 years 1879-83; for other diseases, and for the av. line, an av. for the 6 years 1877-82.

*. t. d. See page 207.

TABLE 2.—CONTINUED.—Diseases in the Central, the Southwestern, the Southern-Central, and the Southeastern Divisions* of the State, for the Years 1877-82, and by Month† in 1882,—Indicating what Per Cent of the Weekly Reports Received Stated Presence of the Diseases Named.‡

DISEASES.	DIV.*	CENTRAL DIVISION.*												SOUTHWESTERN DIVISION.*												SOUTHERN-CENTRAL DIVISION.*												SOUTHEASTERN DIVISION.*																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		1882.†	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	DIV.*	1882.†	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	DIV.*	1882.†	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Av. for Tab. Dis. Rep. Pr.		26	29	30	32	29	28	25	27	25	32	31	28	25		29	28	27	28	32	35	34	34	31	36	41	34	33	32	29	28	27	28	32	35	34	34	31	36	41	34	33	32	29	28	27	28	32	35	34	34	31	36	41	34	33	32																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Brain, Inflamm. of.....		5	4	7	11	4	3	2	0	3	1	1	1	2		9	4	4	2	0	8	6	13	0	0	4	4	3	7	9	4	4	2	0	8	6	13	0	0	4	4	3	7	9	4	4	3	7	9	4	4	3	7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Bowels, Inflamm. of.....		10	15	24	21	6	4	8	8	5	8	10	13	6		9	9	13	10	18	13	8	8	4	5	0	0	6	18	10	6	10	9	13	10	18	13	8	8	4	5	0	0	6	18	10	9	13	8	4	5	0	0	6	18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Bronchitis.....		51	55	57	62	68	70	48	45	29	38	47	51	58		53	60	69	73	77	64	58	58	48	38	39	52	64	64	60	69	73	77	64	58	58	48	38	39	52	64	64	60	69	73	77	64	58	58	48	38	39	52	64																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Cerebro-spinal Men.....		3	11	8	17	15	10	6	5	4	10	0	1	2		1	1	2	4	2	0	0	0	0	0	0	0	0	0	0	1	2	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
Cholera Infantum.....		12	8	1	0	0	0	6	17	24	32	19	3	0		23	11	0	2	0	0	0	0	8	19	41	46	22	18	4	3	7	8	7	3	0	0	0	8	19	41	46	22	18	4	3	7	8	7	3	0	0	8	19	41	46	22	18	4	3	7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Cholera Morbus.....		14	10	1	3	2	7	5	28	31	21	7	9	8		15	12	6	8	7	3	0	17	37	46	18	4	3	7	8	7	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18	4	3	0	17	37	46	18

Disease.	SOUTHERN-CENTRAL DIVISION.*												SOUTHEASTERN DIVISION.*											
	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Tonsillitis.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Whooping-cough.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Ar. for Tab. Dis. Rep. Pr.	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Brain, Inflamm. of.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Bowels, Inflamm. of.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Bronchitis.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Cerebro-spinal Men.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Cholera Infantum.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Cholera Morbus.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Consumption, Pul.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Croup, Membranous.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Diphtheria.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Diarrhea.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Dysentery.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Erysipelas.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Fever, Intermittent.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Fever, Remittent.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Fever, Typh., (Ent'c).....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Fever, Typho-mal.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Influenza.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Measles.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Neuralgia.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Pneumonia.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Puerperal Fever.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Rheumatism.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Scarlatina.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Small-pox.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Tonsillitis.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30
Whooping-cough.....	29	30	31	1	2	3	4	5	6	7	8	9	30	31	1	2	3	4	5	6	7	8	9	30

* 1, 4. See page 207. † For inflam. of brain and inflam. of bowels, an av. for the 3 years 1880-2; for neuralgia and tonsillitis an av. for the 4 years 1879-82; for other diseases and for av. line an av. for the 6 years 1877-82.

TABLE 2.—CONTINUED.—Diseases in the Northwestern Division* for the Years 1879-82, and by Month in 1882, and in the Northern-Central Division* for the Years 1880-82, and by Month in 1882. Indicating on what Per Cent of the Weekly Reports Received the Diseases Named were Reported Present.^a

DIV.*	179-'82	1882†	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
NORTHWESTERN DIVISION.*														
Av. for Tab. Diseases Reported Present.	32	37	46	47	51	53	65	48	56	49	57	55	48	51
Brain, Inflamm. of....	± 3	1	0	0	0	0	0	13	0	0	0	0	0	0
Bowels, Inflamm. of....	± 9	13	13	13	0	0	0	25	13	27	8	33	0	0
Bronchitis.....	65	72	88	75	90	86	100	75	38	33	58	75	89	100
Cerebro spinal Men....	3	6	13	13	30	0	0	0	0	0	17	0	0	0
Cholera Infantum.....	25	34	0	0	0	0	0	38	38	100	92	42	0	0
Cholera Morbus.....	21	30	0	0	10	0	0	13	100	80	83	8	0	0
Consumption, Pulm....	26	32	50	50	50	57	20	0	75	20	8	33	33	0
Croup, Membranous....	10	13	0	0	0	0	0	0	13	20	33	17	22	25
Diphtheria.....	21	36	25	38	60	43	20	88	63	13	33	33	11	25
Diarrhea.....	54	62	38	13	20	43	60	50	100	100	100	83	92	63
Dysentery.....	26	34	0	0	0	14	0	0	38	87	83	58	11	25
Erysipelas.....	16	24	13	0	0	0	20	25	25	27	25	33	44	63
Fever, Intermittent.....	78	95	75	75	80	100	100	100	100	100	100	100	100	100
Fever, Remittent.....	36	51	50	50	30	29	100	50	0	67	75	50	56	50
Fever, Typhoid (En.)....	11	25	50	50	40	14	0	0	0	27	42	33	11	13
Fever, Typho-mal.....	31	29	25	13	0	0	0	0	0	40	42	100	44	25
Influenza.....	43	55	50	50	70	57	100	50	63	27	58	67	44	50
Measles.....	92	18	0	0	0	14	20	38	75	33	17	0	0	25
Neuragia.....	76	71	75	63	50	71	100	88	75	53	67	75	78	63
Pneumonia.....	33	35	25	25	30	71	40	38	0	6	42	42	56	75
Puerperal Fever.....	5	4	0	0	0	0	0	13	13	6	0	0	13	0
Rheumatism.....	77	83	63	88	6	71	100	100	80	80	83	83	100	75
Scarlatina.....	12	16	0	0	0	43	40	13	25	27	0	0	33	38
Small-pox.....	2	9	0	0	0	71	80	13	0	0	0	0	0	0
Tonsillitis.....	59	87	88	88	100	100	100	88	88	67	75	100	89	88
Whooping-cough.....	27	25	25	0	0	14	40	0	25	53	33	25	22	50
NORTHERN CENTRAL DIVISION.*														
Div.*	180-'82	1882†	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for Tab. Diseases Reported Present.	30	27	38	32	38	31	35	32	32	35	38	32	39	36
Brain, Inflamm. of....	4	2	0	8	0	0	5	0	0	0	0	0	0	0
Bowels, Inflamm. of....	7	8	0	8	13	6	10	13	8	13	25	8	0	0
Bronchitis.....	49	53	50	33	53	67	60	56	33	47	67	42	60	67
Cerebro spinal Men....	10	7	0	17	0	0	25	6	0	7	8	8	0	0
Cholera Infantum.....	13	7	0	8	0	0	0	0	8	40	17	8	0	0
Cholera Morbus.....	19	15	0	0	7	8	0	19	42	47	50	17	0	0
Consumption, Pulm....	25	35	25	42	27	25	50	50	33	33	25	25	33	33
Croup, Membranous....	8	10	0	0	0	17	15	6	0	0	8	25	33	8
Diphtheria.....	53	33	17	42	60	17	30	25	33	40	33	33	40	17
Diarrhea.....	48	49	58	25	40	33	35	44	75	87	83	58	40	17
Dysentery.....	18	14	8	0	0	8	5	6	25	13	42	50	20	0
Erysipelas.....	35	24	17	33	20	25	30	25	17	13	33	17	33	25
Fever, Intermittent.....	72	67	58	67	60	67	85	81	75	80	67	58	40	50
Fever, Remittent.....	63	66	83	83	67	75	75	50	58	60	58	67	67	50
Fever, Typhoid (En.)....	15	5	8	0	13	17	0	6	0	7	0	0	7	0
Fever, Typho-mal.....	31	30	42	25	27	17	25	19	17	53	50	42	33	8
Influenza.....	10	19	33	17	20	8	35	13	8	7	0	17	33	25
Measles.....	24	15	33	25	27	3	5	31	58	0	0	0	0	0
Neuragia.....	52	55	58	50	47	83	70	69	58	60	50	25	60	67
Pneumonia.....	39	35	33	75	53	25	35	37	8	13	17	42	40	42
Puerperal Fever.....	5	5	0	8	0	10	0	55	50	47	42	42	47	42
Rheumatism.....	57	50	67	42	67	42	55	56	50	47	42	42	47	42
Scarlatina.....	10	4	8	7	0	0	0	13	8	7	0	0	0	0
Small-pox.....	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis.....	63	58	50	58	73	75	45	63	33	47	50	50	67	83
Whooping-cough.....	13	16	0	0	0	0	25	31	8	20	17	25	40	8

* † Av. for only the 5 years 1880-82.

* †, ‡. For these references, see foot notes on page 207.

WEEKLY REPORTS OF DISEASES,—CALENDAR YEAR 1882.

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were received,—indicating the prevalence as regards both Time and Area.

DISEASES.	WESTERN DIVISION.*				BAY AND EASTERN.*				CENTRAL DIV.*				SOUTHWESTERN DIV.*				SOUTHEASTERN DIV.*			
	Per Cent of Observ- ers Reporting Pres- ence of b	Av. Pr Ct of Weeks Reported Present, c	Per cent of Reports Where Present, c	Stating Pres. of d	Av. Order of Preva- lence Where Pres. e	Per cent of Observ- ers Reporting Pres- ence of b	Av. per cent of Weeks Reported Present, c	Per cent of Reports Where Present, c	Stating Pres. of d	Av. Order of Preva- lence Where Pres. e	Per cent of Observ- ers Reporting Pres- ence of b	Av. per cent of Weeks Reported Present, c	Per cent of Reports Where Present, c	Stating Pres. of d	Av. Order of Preva- lence Where Pres. e	Per cent of Observ- ers Reporting Pres- ence of b	Av. per cent of Weeks Reported Present, c	Per cent of Reports Where Present, c	Stating Pres. of d	Av. Order of Preva- lence Where Pres. e
Average for Tabulated Dis- eases Reported Present.	46	71	33	4.7	48	72	35	5.0	41	65	26	3.6	41	68	28	3.7	41	69	28	3.8
Inflammation of Brain....	8	50	4	9.0	17	31	5	7.7	12	29	3	5.1	11	33	4	4.7	9	39	3	3.1
Inflammation of Bowels....	32	56	17	6.6	39	53	21	6.8	23	38	11	5.2	20	46	9	5.2	22	46	10	4.8
Bronchitis.....	70	87	62	3.4	86	87	75	3.7	71	74	53	3.5	79	76	60	3.0	80	81	65	3.2
Cerebro-spinal Meningitis	10	43	5	8.6	18	43	8	8.0	11	54	8	4.5	4	31	1	3.8	9	49	4	5.1
Cholera Infantum.....	22	55	13	5.5	33	64	21	4.8	16	52	8	4.5	22	51	11	3.6	17	47	8	4.6
Cholera Morbus.....	30	58	17	7.0	41	54	22	6.3	22	47	10	4.7	28	40	12	4.1	29	54	16	4.2
Consumption, Pulmonary	71	78	56	5.8	88	88	77	5.4	73	86	63	3.9	80	71	44	3.8	68	89	60	4.7
Croup, Membranous.....	22	59	13	7.4	25	44	11	7.9	10	27	3	4.8	14	41	6	5.3	10	39	4	5.0
Diphtheria.....	44	62	27	6.4	52	58	29	6.0	55	50	32	3.8	19	44	8	3.9	34	51	18	4.4
Diarrhea.....	68	71	48	4.3	71	77	55	4.4	69	62	37	3.5	65	59	38	3.8	66	69	46	3.4
Dysentery.....	42	70	30	5.3	35	62	21	6.0	22	50	11	4.7	25	42	10	4.4	27	47	13	4.4
Erysipelas.....	51	53	27	6.1	43	52	22	6.6	39	50	20	5.1	37	49	18	5.1	39	51	20	4.8
Fever, Intermittent.....	90	81	74	1.9	90	91	82	1.6	86	86	74	2.2	90	82	74	2.8	86	84	72	2.0
Fever, Remittent.....	72	78	56	3.2	68	75	51	4.1	69	74	45	3.0	68	72	49	3.4	66	79	52	3.0
Fever, Typhoid (Enteric).	31	63	20	7.4	18	53	10	5.9	23	52	12	3.7	9	36	3	3.5	21	61	13	4.8
Fever, Typho-malarial....	57	74	41	5.1	51	69	35	5.4	30	54	16	3.7	42	66	28	4.7	32	57	18	4.7
Influenza.....	62	77	48	2.9	57	78	44	4.0	57	68	39	2.7	61	72	44	2.7	53	72	38	2.9
Measles.....	18	44	8	6.5	17	46	8	7.2	10	46	5	4.7	27	58	16	3.1	20	60	12	3.5
Neuralgia.....	80	83	67	3.9	85	89	75	4.0	86	73	63	3.2	91	79	72	3.5	86	81	70	3.5
Pneumonia.....	68	75	51	4.7	61	68	41	5.4	61	59	36	3.8	61	66	40	4.6	57	63	36	4.1
Puerperal Fever.....	32	42	14	5.7	25	39	10	7.3	14	37	5	3.9	14	30	4	3.9	12	36	4	4.8
Rheumatism.....	79	77	61	4.2	86	88	76	4.8	80	74	59	3.4	87	83	73	3.8	86	80	69	3.6
Scarlatina.....	38	71	27	5.2	43	58	25	4.9	24	45	11	4.4	27	47	13	3.6	32	52	17	5.4
Small-pox.....	9	74	7	6.1	5	58	3	6.8	3	77	2	7.9	5	48	2	7.6	3	50	1	8.9
Tonsillitis.....	81	66	53	4.6	80	80	64	4.9	66	57	38	3.5	64	65	43	3.1	67	64	42	3.9
Whooping-cough.....	18	61	11	4.1	22	60	13	5.9	30	57	17	3.5	25	71	18	3.3	33	67	23	3.7

b, c, d, e. See foot-notes with these marks, in Table 2, pages 208-207.

* For counties in each division see Exhibit 1, page 5; also a map on page 113.

EXHIBIT 42.—By Months and by Geographical Divisions of the State, the Names of 159 Observers whose Weekly Reports of Diseases for 1882 are Compiled in Tables 1, 2, 3, and 4, the Localities* for which they Report, and the Number of Reports received from each Observer.

DIVISIONS AND LOCALITIES REPRESENTED, AND PHYSICIANS WHO REPORTED.	WEEKLY REPORTS IN 1882.—COMPILED ON PAGES 201-17.												
(Health Officers in Italics; those also Cor- respondents marked with a *)	YEAR, 1882.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
ALL LOCALITIES.....	4,745	387	398	477	336	459	343	346	495	381	358	430	335
UPPER-PENINSULAR DIVISION.....†	162	12	12	13	11	17	15	12	19	8	7	16	20
Escanaba, W. W. Multiken,* M. D.....	11	4	4	3								3	4
Hancock, Thos. M. Planner, M. D.....	7												
Hancock, J. E. Scallon,* M. D.....	25				3	5	4	4	5	4			
Houghton, H. W. Jones, M. D.....	32	4	4	5	4	3					3	5	4
Mackinac, S. S. Jessop, M. D.....	30						4	4	5	4	4	5	4
Marquette, J. A. Delardins, M. D.....	5								5				
Marquette, A. Klein Thiel, M. D.....	4												4
Nonesuch, Mason W. Gray, M. D.....	15					4	3	4	4				
Ontonagon, H. E. Carey, M. D.....	7											3	4
Sault Ste. Marie, G. A. Harding, M. D.....	26	4	4	5	4	5	4						
NORTHWESTERN DIVISION.....†	110	8	8	10	7	5	8	8	15	12	12	9	8
Cadillac, I. N. Coleman, M. D.....	21						4	4	5	4	4		
Manistee, C. V. Beebe, M. D.....	16	4	4	5	3								
Manistee, J. Kinsley, M. D.....	26							4	5	4	4	5	4
Manistee, Geo. LaMontagne, M. D.....	26	4	4	5	4	5	4						
Manton, J. B. Manton, M. D.....	21								5	4	4	4	4
NORTHERN DIVISION.....†	73	4	4	5	4	5	3	4	10	8	8	10	8
Charlevoix, Wm. M. Preston, M. D.....	22								5	4	4	5	4
Gaylord, J. Robinson, M. D.....	51	4	4	5	4	5	3	4	5	4	4	5	4
WESTERN DIVISION.....†	380	32	36	42	27	30	15	19	38	34	35	45	27
Casnovia, C. E. Koon, M. D.....	21								4	4	4	5	4
Cedar Springs, C. S. Ford, M. D.....	52	4	4	5	4	5	4	4	5	4	4	5	4
G'd Haven, A. Vander Veen,* M. D.....	35	4	4	5	4	5					4	5	4
Grand Rapids, A. Hazelwood, M. D.....	46	4	4	5	4	5	4	3		4	4	5	4
Hersey, G. V. Chamberlain, M. D.....	8								5	3			
Lisbon, S. J. Koon, M. D.....	15	4	4	4	3								
Lowell, O. C. McDannell, M. D.....	51	4	4	5	4	5	4	4	5	3	4	5	4
Ludington, A. P. McConnell, M. D.....	22	4	4	5								5	4
Muskegon, J. F. Denslow, M. D.....	39			4	5	4	5		4	4	4	5	
Muskegon, O. C. Williams, M. D.....	22	4	4	5	4	5							
Newaygo, D. W. Flora, M. D.....	7						3	4					
N. Muskegon, N. W. Andrews, M. D.....	18								5	4	4	5	
Pentwater, Wm. E. Dockry, M. D.....	9												
Reed City, A. W. Miller, M. D.....	12								5	4	3		
Rockford, D. W. C. Burch, M. D.*	11	4	4	3									
Zeeland, T. G. Huizinga, M. D.....	12										4	5	3
NORTHERN-CENTRAL DIVISION.....†	165	12	12	15	12	20	16	12	15	12	12	15	12
Big Rapids, Irus W. Badger, M. D.....	52	4	4	5	4	5	4	4	5	4	4	5	4
Morley, B. F. Brown, M. D.....	9					5	4						
Mt. Pleasant, L. J. King, M. D.....	52	4	4	5	4	5	4	4	5	4	4	5	4
Roscommon, W. S. Washington, M. D.....	52	4	4	5	4	5	4	4	5	4	4	5	4
BAY AND EASTERN DIVISION.....†	652	52	52	70	51	58	52	51	69	56	43	54	44
Bay City, Harvey Gilbert, M. D.....	38				3	5	4	4	5	4	4	5	4
Bay City, W. R. Marsh, M. D.....	52	4	4	5	4	5	4	4	5	4	4	5	4
Bay City, J. R. Thomas, M. D.....	14	4	4	5	1								
Brockway Centre, A. Mitchell, M. D.....	52	4	4	5	4	5	4	4	5	4	4	5	4
Chesaning, H. W. Marsh, M. D.....	22								5	4	4	5	4
East Saginaw, B. L. Cleveland, M. D.....	17	4	4	5	4								
East Saginaw, Samuel Kitchen,* M. D.....	16						4	4	4	4			
Lapeer, Hugh McCall,* M. D.....	48	4	4	5	3	5	4	3	5	4	3	4	4
Lexington, A. M. Oldfield, M. D.....	39	4	4	5	4	5	4	4	5	4			
Port Huron, D. M. Bennett, M. D.....	33					3	4	4	5	4	4	5	4
Port Huron, A. A. Whitney, M. D.....	39	4	4	5	4	5	4	4	5	4			
Saginaw City, F. B. Florentine, M. D.....	34					4	4	4	5	4	4	5	4
Saginaw City, N. D. Lee, M. D.....	52	4	4	5	4	5	4	4	5	4	4	5	4
Saginaw City, I. N. Smith, M. D.....	18	4	4	5	4	1							

* Health officers of cities are supposed to report for their cities only; the reports of other observers are not thus restricted in locality, but in many cases include the vicinity as well as the corporate limits of the place named.

* Health Officer and Correspondent.

† For counties in each division see Exhibit 1, page 5;

also a map on page 113.

EXHIBIT 42.—CONTINUED.

DIVISIONS AND LOCALITIES REPRESENTED, AND PHYSICIANS WHO REPORTED.

WEEKLY REPORTS IN 1882.—COMPILED ON PAGES 201-17.

(Health Officers in Italics; those also Correspondents marked with a *.)

YEAR, 1882.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		
BAY AND EASTERN DIV.†—Continued:														
St. Clair, <i>W. H. Smith,* M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Thornville, <i>J. S. Caulkins, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Vassar, <i>H. A. Brockway, M. D.</i>	5			5										
West Bay City, <i>A. F. Hagadorn, M. D.</i>	17	4	4	5	4									
W. Bay City, <i>J. W. Hauzhurst,* M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
CENTRAL DIVISION.	926	80	76	90	72	98	64	64	94	72	72	80	64	
Corunna, <i>A. G. Bruce, M. D.</i>	13	4	4	5										
Dansville, <i>C. C. Sherman, M. D.</i>	17	4	4	5		4								
Dansville, <i>E. Sherwood, M. D.</i>	9							5		4				
DeWitt, <i>G. W. Topping, M. D.</i>	22	4	4	5	4	5								
Elsie, <i>E. V. Chase, M. D.</i>	35	4	4	5	4	5	4	4	5					
Fentonville, <i>I. N. Brainerd, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Flint, <i>H. C. Fairbank,* M. D.</i>	10		4	5	1									
Flint, <i>Geo. W. Howland, M. D.</i>	4	4												
Flint, <i>A. A. Thompson, M. D.</i>	38				3	5	4	4	5	4	4	5	4	
Greenville, <i>Chas. S. Sheldon, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Hastings, <i>A. P. Drake, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Howell, <i>Horace R. Hitchcock, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Hubbardston, <i>J. J. Robbins, M. D.</i>	25					4	4	4	5	4				
Ionia, <i>L. Joslin, M. D.</i>	4													
Ionia, <i>S. V. Romig, M. D.</i>	13	4	4	5										
Ithaca, <i>C. W. Marvin, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Laingsburg, <i>E. B. Ward, M. D.</i>	4													
Lansing, <i>J. H. Wellings, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Linden, <i>Harvey H. Chase, M. D.</i>	5					5								
Lyons, <i>B. M. Hutchinson, M. D.</i>	8	4	4											
Lyons, <i>D. C. Spalding,* M. D.</i>	9				4	5	4							
Mason, <i>A. B. Campbell, M. D.</i>	34	4	4			4	4	4	5	4	4	5	4	
Mason, <i>W. W. Root,* M. D.</i>	18	4	4	5	4	1								
Middleville, <i>G. W. Malleson, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Muir, <i>L. S. Stevens,* M. D.</i>	9													
Otisville, <i>E. D. Lewis, M. D.</i>	21								4	4	4	5	4	
Otisville, <i>C. A. Wisner, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Ovid, <i>O. B. Campbell, M. D.</i>	8													
Pierson, <i>James Tollen, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Stanton, <i>A. L. Corey, M. D.</i>	13													
Stanton, <i>D. A. McLean, M. D.</i>	22					5	4	4	5	4				
Wacousta, <i>F. A. Jones, M. D.</i>	13										4	5	4	
Webberville, <i>R. B. Smith, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Woods' Corners, <i>Geo. Pray, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
SOUTHWESTERN DIVISION	451	48	48	57	39	53	24	27	39	28	27	33	28	
Bangor, <i>J. Camp, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Benton Harbor, <i>Geo. M. Bell, M. D.</i>	11	4	4	3										
Dayton, <i>Robert Henderson, M. D.</i>	21	4	4	5	4	4								
Niles, <i>O. P. Horn, M. D.</i>	21	4	4	5	3	5	4	4						
Niles, <i>James S. Reeves, M. D.</i>	35	4	4	5	4	5	4							
Niles, <i>Irwin Simpson,* M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Otsego, <i>Milton Chase, M. D.</i>	50	4	4	5	4	5	4	4	5	4	4	3	4	
Paw Paw, <i>Josiah Andrews, M. D.</i>	42	4	4	5	4	4				4	4	5	4	
Plainwell, <i>B. Thompson, M. D.</i>	22									5	4	4	5	4
St. Joseph, <i>R. F. Stratton, M. D.</i>	38	4	4	4		5	4	4		5	4	3	5	4
Saugatuck, <i>Henry H. Stimson, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
South Haven, <i>G. V. Hilton, M. D.</i>	25	4	4	5	4	5		3						
Wayland, <i>E. H. Ryno, M. D.</i>	30	4	4	5	4	5	4	4						
SOUTHERN-CENTRAL DIVISION	1,333	103	111	129	86	121	102	106	141	111	103	128	92	
Albion, <i>Wm. W. Collins, M. D.</i>	22	4	4	5	4	5								
Albion, <i>Amos Crosby, M. D.</i>	52	4	4	5	4	5	4							
Ann Arbor, <i>W. F. Breakey,* M. D.</i>	18							3	5	3	4	3		
Brooklyn, <i>E. N. Palmer, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Burr Oak, <i>C. D. Parsons, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Clinton, <i>A. W. Alvord, M. D.</i>	13	4	4	5										
Clinton, <i>J. W. Burchard, M. D.</i>	35					5	4	4	5	4	4	5	4	
Coldwater, <i>J. M. Long, M. D.</i>	34					4	4	4	5	4	4	5	4	
Coldwater, <i>L. H. Wurtz, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Grass Lake, <i>E. B. Chapin, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5	4	
Grass Lake, <i>H. J. Hale, M. D.</i>	43					5	4	4	5	4	3	5		
Hillsdale, <i>John W. Falley,* M. D.</i>	8	4	4											
Hillsdale, <i>Bion Whelan,* M. D.</i>	48			5	4	5	4	4	5	4	4	5	4	
Homer, <i>L. T. VanHorn, M. D.</i>	4		4											

(Continued on page 222.)

* Health Officer and Correspondent.

† For counties in each division see Exhibit 1, page 5.
[This Exhibit 42 is continued on page 222.]

EXHIBIT 43.—*Diseases from which there seems to have been the Most Sickness in Michigan in 1882, as indicated by the Per Cent of Weekly Reports Stating Presence of the Diseases, as studied in connection with the Average Order of Prevalence of said Diseases when Reported Present; also, Order, Per Cent of Reports, and Average Order for the Same Diseases in 1881, 1880, and 1879.*

1882.				1881.				1880.				1879.			
	ORDER.*	DISEASES IN ORDER OF APPARENT SICKNESS IN 1882, MOST PREVALENT ONE FIRST.	Per Cent of Reports Stating Pres'ce of <i>d</i>	Av. Order of Prevalence when Pres. <i>e</i>	ORDER.*	Per Cent of Reports Stating Pres'ce of <i>d</i>	Av. Order of Prevalence when Pres. <i>e</i>	ORDER.*	Per Cent of Reports Stating Pres'ce of <i>d</i>	Av. Order of Prevalence when Pres. <i>e</i>	ORDER.*	Per Cent of Reports Stating Pres'ce of <i>d</i>	Av. Order of Prevalence when Pres. <i>e</i>		
More Sickness than Average for 26 Diseases, in 1882.	1	Intermittent Fever..	71	2.0	1	82	2.4	1	82	2.3	1	82	2.2		
	2	Neuralgia	68	3.6	4	65	4.3	5	64	4.5	6	59	4.5		
	3	Bronchitis.....	65	3.3	3	62	3.9	2	64	3.7	2	64	3.6		
	4	Rheumatism	68	3.8	2	71	4.6	4	71	4.6	3	72	4.6		
	5	Consumption, Pulm..	66	4.6	7	71	5.6	8	68	5.7	5	70	5.6		
	6	Remittent Fever.....	48	3.3	5	54	3.5	3	56	3.3	4	57	3.3		
	7	Diarrhea	48	3.8	6	52	3.9	7	47	4.2	8	48	4.4		
	8	Influenza.....	40	3.1	9	35	3.5	6	42	3.0	7	45	3.1		
	9	Tonsillitis	47	3.9	8	48	4.5	9	49	4.4	9	45	4.5		
	10	Pneumonia.....	39	4.4	10	41	5.4	10	42	5.1	10	41	5.2		
	(11)	Av. for 26 Diseases	30	4.2	(11)	33	4.9	(11)	32	4.7	(11)	33	4.7		
Less than said Average.	11	Diphtheria	25	4.8	12	34	5.6	13	27	5.7	11	29	5.4		
	12	Typho-mal. Fever....	24	4.9	13	29	5.2	15	24	5.5	16	22	5.8		
	13	Whooping-cough.....	17	4.4	19	15	6.3	11	32	4.8	13	23	5.5		
	14	Scarlet Fever	18	4.9	20	19	6.7	19	15	6.5	12	23	5.5		
	15	Erysipelas	22	5.5	17	23	6.2	17	25	6.3	17	25	6.5		

* Judging from the per cent of reports which stated presence of the diseases, in connection with the order of prevalence when prevalent.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from *all observers* in the State. It combines and states in a general way, an idea of the *time* a disease was prevalent, with an idea of the area of its prevalence.

e The disease having the greatest number of cases was to be marked 1 in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals of the Order of Prevalence columns, in Table 3 (omitted in this Report), by the number of men who reported the disease present. The column is, therefore, an average not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the order of prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of men who reported the different diseases present, thus counting each man once for every disease he reported present. As a rule, small numbers in this column indicate the large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer, from week to week, the greater will be the "average" in this column.

WHAT DISEASES CAUSE MOST SICKNESS?

The answer to the above question for 1882 is given in Exhibit 43, which also

[Continued on page 222.]

EXHIBIT 44.—*In Six (of eleven) Geographical Divisions* of the State, the Diseases from which there seems to have been the Greatest Amount of Sickness in 1882, as indicated by the Per Cent of Weekly Reports Stating Presence of each of 26 Leading Diseases, when studied in connection with the Average Order of Prevalence of said Diseases when reported present.*

	ORDER. [†]	DISEASES IN ORDER OF APPARENT AMOUNT OF SICKNESS, MOST PREVALENT ONE FIRST.	Per Cent of Reports Stating Pres. of, ^d	Av. Order of Prevalence when Pres. ^e		DISEASES IN ORDER OF APPARENT AMOUNT OF SICKNESS, MOST PREVALENT ONE FIRST.	Per Cent of Reports Stating Pres. of, ^d	Av. Order of Prevalence when Pres. ^e		DISEASES IN ORDER OF APPARENT AMOUNT OF SICKNESS, MOST PREVALENT ONE FIRST.	Per Cent of Reports Stating Pres. of, ^d	Av. Order of Prevalence when Pres. ^e
More sickness than av. for 26 diseases.		BAY & EAST'N DIV.*				SOUTH-WESTERN DIV.*				SOUTHERN-CEN. DIV.*		
	1	Intermittent Fever	82	1.6		Intermittent Fever	74	2.8		Intermittent Fever	72	2.0
	2	Bronchitis	75	3.7		Neuralgia	72	3.5		Neuralgia	70	3.5
	3	Neuralgia	75	4.0		Rheumatism	73	3.8		Bronchitis	65	3.2
	4	Rheumatism	76	4.8		Bronchitis	60	3.0		Rheumatism	69	3.6
	5	Consumption, Pul.	77	5.4		Consumption, Pul.	71	4.4		Remittent Fever	52	3.0
	6	Tonsillitis	64	4.9		Influenza	44	2.7		Consumption, Pul.	60	4.7
	7	Diarrhea	55	4.4		Remittent Fever	49	3.4		Diarrhea	46	3.4
	8	Remittent Fever	51	4.1		Tonsillitis	43	3.1		Influenza	38	2.9
	9	Influenza	44	4.0		Diarrhea	38	3.8		Tonsillitis	42	3.9
	10	Pneumonia	41	5.4						Pneumonia	36	4.1
Less.	(10)					Av. of 26 Diseases	28	3.7				
	(11)	Av., 26 Diseases	35	5.0						Av. of 26 Diseases	28	3.8
	10					Pneumonia	40	4.6				
	11	Typho-mal. Fever	35	5.4		Measles	16	3.1		Whooping-cough	23	3.7
	12	Scarlet Fever	25	4.9		Whooping-cough	18	3.3		Measles	12	3.5
	13	Cholera Infantum	21	4.8		Scarlet Fever	13	3.6		Cholera Morbus	16	4.2
	14	Diphtheria	29	6.0		Typho-mal. Fever	28	4.7		Diphtheria	18	4.4
		WESTERN DIVISION.*				CENTRAL DIVISION.*				SOUTH-EASTERN DIV.*		
	1	Intermittent Fever	74	1.9		Intermittent Fever	74	2.2		Consumption, Pul.	91	3.9
	2	Neuralgia	67	3.9		Neuralgia	63	3.2		Bronchitis	75	3.2
More sickness than av. for 26 diseases.	3	Bronchitis	62	3.4		Rheumatism	59	3.4		Intermittent Fever	68	2.6
	4	Remittent Fever	56	3.2		Consumption, Pul.	63	3.9		Rheumatism	75	4.3
	5	Rheumatism	61	4.2		Bronchitis	53	3.5		Neuralgia	62	4.2
	6	Influenza	48	2.9		Remittent Fever	45	3.0		Diarrhea	63	4.4
	7	Tonsillitis	53	4.6		Influenza	39	2.7		Tonsillitis	55	3.6
	8	Diarrhea	48	4.3		Tonsillitis	38	3.5		Remittent Fever	40	3.4
	9	Pneumonia	51	4.7		Diarrhea	37	3.5		Pneumonia	47	4.8
	10	Consumption, Pul.	56	5.8		Pneumonia	36	3.8		Influenza	36	4.6
	11	Typho-mal. Fever	41	5.1		Diphtheria	32	3.8		Diphtheria	37	5.3
	(12)	Av. for 26 Diseases	33	4.7		Av. for 26 Diseases	26	3.6		Av. for 26 Diseases	37	5.6
	12	Dysentery	30	5.3		Whooping-cough	17	3.5		Scarlet Fever	30	4.7
Less.	13	Scarlet Fever	27	5.2		Typho-mal. Fever	16	3.7		Erysipelas	36	6.6
	14	Whooping-cough	11	4.1		Typhoid Fever	12	3.7		Typho-mal. Fever	31	6.3

* For counties in each division see Exhibit 1, page 5; also page 113.

† Judging from the per cent of reports in connection with the "average order of prevalence where present."

^d, ^e See foot-notes with these marks on pages 207, 220.

EXHIBIT 42.—CONTINUED FROM PAGE 219.

DIVISIONS AND LOCATIONS REPRESENTED, AND PHYSICIANS WHO REPORTED.

(Health Officers in Italics; those also Correspondents marked with a*.)

WEEKLY REPORTS IN 1882.—COMPILED ON PAGES 201-17.

YEAR, 1882.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
SOUTHERN-CENTRAL DIV.†—Cont'd:												
Hudson, <i>Geo. W. Rice, M. D.</i>	12	4	4	4	—	—	—	4	4	4	5	4
Hudson, A. R. Smart, M. D.	47	4	4	5	3	4	3	3	4	4	5	4
Jackson (Prison) E. L. Kimball, M. D.	52	4	4	5	4	5	4	4	5	4	5	4
Jackson, W. Worsford, M. D.	48	4	4	5	4	5	4	4	5	4	5	4
Jerome, A. A. Dunton, Jr., M. D.	20	—	—	—	—	—	3	4	4	4	5	4
Kalamazoo, <i>J. M. Snook, M. D.</i>	30	—	—	—	—	—	4	4	5	4	5	4
Kalamazoo, W. B. Southard, M. D.	52	4	4	5	4	5	4	4	4	4	5	4
Manchester, A. C. Taylor, M. D.	4	4	—	—	—	—	—	—	—	—	—	—
Marshall, <i>L. E. Gallup, M. D.</i>	35	—	—	—	—	5	4	4	5	4	4	5
Marshall, H. L. Joy, M. D.	9	4	—	5	—	—	—	—	—	—	—	—
Marshall, <i>J. F. Smiley,* M. D.</i>	39	4	4	5	3	3	—	—	3	4	4	5
Mendon, H. C. Clapp, M. D.	52	4	4	5	4	5	4	4	5	4	4	5
Mendon, <i>C. W. Shepard,* M. D.</i>	22	—	—	—	—	—	—	—	5	4	4	5
Mendon, Edwin Stewart, M. D.	52	4	4	5	4	5	4	4	5	4	4	5
Morenci, C. T. Bennett, M. D.	8	4	4	—	—	—	—	—	—	—	—	—
North Adams, <i>W. R. Dittmars, M. D.</i>	26	—	—	—	—	—	—	4	5	4	4	5
Parma, <i>N. J. DePuy, M. D.</i>	35	4	4	5	4	5	4	4	5	—	—	—
Quincy, <i>F. E. Marsh, M. D.</i>	4	—	—	—	—	—	4	—	—	—	—	—
Reading, <i>A. B. Strong, M. D.</i>	11	3	3	5	—	—	—	—	—	—	—	—
Richland, <i>J. M. Rankin, M. D.</i>	30	4	4	5	4	5	4	4	—	—	—	—
Tecumseh, L. G. North, M. D.	39	4	4	5	4	5	4	4	5	4	—	—
Three Rivers, C. W. Backus, M. D.	52	4	4	5	4	5	4	4	5	4	4	5
Union City, Ralph P. Beebe, M. D.	52	4	4	5	4	5	4	4	5	4	4	5
Union City, E. H. Hard, M. D.	48	—	4	5	4	5	4	4	5	4	4	5
Vicksburg, S. C. VanAntwerp, M. D.	8	—	—	—	—	—	—	4	4	4	—	—
Ypsilanti, <i>Edward Batwell,* M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5
SOUTHEASTERN DIVISION.....†	493	36	39	46	27	52	44	43	55	40	39	40
Armada, <i>C. H. Lincoln, M. D.</i>	52	4	4	5	4	5	4	4	5	4	4	5
Detroit (E. D.) Judson Bradley, M. D.	26	4	4	5	4	5	4	—	—	—	—	—
Detroit, W. H. Rouse, M. D.	52	4	4	5	4	5	4	4	5	4	4	5
Dundee, <i>J. W. Mason, M. D.</i>	43	4	4	5	4	5	4	4	5	4	4	5
Memphis, <i>D. H. Cole, M. D.</i>	50	4	4	4	4	4	4	4	5	4	4	5
Milford, <i>C. G. Davis, M. D.</i>	12	4	4	4	—	—	—	—	—	—	—	—
Monroe, <i>J. C. Wood, M. D.</i>	32	—	—	—	—	3	4	4	5	4	3	5
Northville, J. M. Swift, M. D.	38	—	—	—	3	5	4	4	5	4	4	5
Orion, <i>W. L. Cole, M. D.</i>	30	—	—	—	—	—	4	4	5	4	4	5
Petersburg, <i>S. L. Jones,* M. D.</i>	24	—	3	3	—	5	4	4	5	—	—	—
Petersburg, <i>T. H. McDonald, M. D.</i>	5	—	—	—	—	5	—	—	—	—	—	—
Pontiac, <i>W. G. Elliott,* M. D.</i>	13	4	4	5	—	—	—	—	—	—	—	—
Pontiac, <i>Wm. McCarroll, M. D.</i>	25	—	—	—	—	—	—	3	5	4	4	5
Washington, Albert Yates, M. D.	13	4	4	5	—	—	—	—	—	—	—	—
Wayne, <i>Ira W. Fletcher,* M. D.</i>	26	—	—	—	—	5	4	4	5	4	4	5
Wyandotte, E. P. Christian, M. D.	52	4	4	5	4	5	4	4	5	4	4	5

* Health Officer and Correspondent.

† For counties in each division see Exhibit I, page 5.

[Continued from page 220.]

permits of a comparison of statements for the year 1882 with similar statements for preceding years.

Exhibit 44 contains for the six divisions of the State from which sufficient reports were received to be representative, statements as to what diseases caused most sickness. The diseases shown to have caused most sickness are placed first in order.

CLIMATE AND SICKNESS.*

Exhibit 46,* (page 224,) is an attempt to learn something of the relations of bronchitis to meteorological conditions, by noting whether each condition was above or below its average for the year, in months when more and in months when less bronchitis than the average for the year was reported. The months are arranged in order according to the amount of bronchitis reported, those in which most bronchitis was reported being placed first in the column,

[Continued on page 225.]

* The remarks under this head are applicable also, by changing the name of the disease, to diseases treated in Exhibits 48, 50, 51, 52, and 53, etc., on following pages.

EXHIBIT 45.—Names of Stations where were made the Observations of Meteorological Conditions used in Exhibit 46 and following exhibits, relative to Sickness and Meteorological Conditions in 1882; also the Temperature, Humidity, Cloudiness, Ozone, Velocity of Wind, or Atmospheric Pressure, at each station for which observations of the given condition are included in the summary statement relative to that condition in said exhibits.

STATIONS.* (Those of the U. S. Signal Service in Italics.)	TEMPERATURE.		HUMIDITY.		Per Cent of Cloudiness.	OZONE.		Wind, Av. Velocity.	ATMOSPHERIC PRESSURE.		
	Av. Daily Range.	Average.	Relative.	Absolute.		Day.	Night.		Range.		Average.
									Monthly.	Av. Daily.	
Number of Stations included in Average. }	17	22	22	23	23	20	20	8	8	8	21
Average.....	17.43	47.14	76	3.48	61	3.41	3.50	9.6	.915	.211	29.138
Marquette.....	14.30	42.28	71	2.79	63	-----	-----	8.7	.974	.224	29.283
Escanaba.....	14.62	42.76	76	3.06	63	3.22	2.96	8.5	.946	.223	29.343
Traverse City.....	16.93	45.13	83	3.49	62	3.22	3.29	-----	.942	.218	29.365
Alpena.....	15.22	42.68	76	3.02	63	4.24	4.45	9.9	-----	-----	29.360
Harrisville.....	20.07	44.62	65	2.89	50	4.16	4.35	-----	-----	-----	29.341
Grand Haven.....	12.03	48.18	76	3.53	57	3.57	3.47	11.3	.916	.204	29.354
Reed City.....	24.09	45.63	71	3.27	65	3.75	4.01	-----	.922	.214	28.872
Port Huron.....	14.90	45.78	79	3.41	63	2.78	2.79	8.7	-----	-----	29.346
Thornville.....	15.74	49.02	77	3.67	56	3.23	3.79	-----	-----	-----	29.035
Agricultural College.....	19.39	47.57	79	3.60	59	-----	-----	-----	-----	-----	29.094
Hastings.....	-----	-----	77	3.66	67	3.76	3.90	-----	-----	-----	29.193
Lansing.....	18.73	49.23	71	3.45	53	3.23	3.71	10.7	.903	.202	29.041
Otisville.....	22.36	47.21	80	3.59	65	3.11	3.87	-----	-----	-----	28.991
Ann Arbor.....	17.92	47.31	80	3.50	60	2.75	2.58	9.2	.848	.196	29.053
Battle Creek.....	-----	50.20	69	3.62	59	2.90	2.47	-----	-----	-----	28.456
Hillsdale.....	-----	47.70	73	3.46	63	3.04	3.39	-----	-----	-----	28.828
Kalamazoo.....	18.02	48.69	72	3.51	69	3.06	3.41	-----	-----	-----	29.121
Marshall.....	18.57	49.58	78	3.78	60	3.70	2.80	-----	-----	-----	-----
Mendon.....	-----	48.91	79	3.78	58	3.12	3.25	-----	-----	-----	29.094
Parkville.....	-----	48.57	-----	3.92	65	4.34	4.87	-----	-----	-----	-----
Tecumseh.....	-----	48.06	80	3.71	56	3.59	3.52	-----	.869	.199	29.146
Detroit.....	14.35	51.20	72	3.72	59	-----	-----	9.9	-----	-----	29.288
Washington.....	19.08	46.85	79	3.54	58	3.27	3.03	-----	-----	-----	29.288

* At the U. S. Signal Service Stations the observations of mean temperature, humidity, cloudiness, and atmospheric pressure were made at 7 A. M., 3 P. M., and 11 P. M. Washington mean time, which is faster than local time as follows: At Port Huron, 22 m.; at Detroit, 24 m.; at Alpena, 26 m.; at Grand Haven, 37 m.; at Escanaba, 40 m.; at Marquette 41 m. At the other stations the observations of these conditions were made at 7 A. M., 2 P. M., and 9 P. M., local time. Observations of range of temperature were made with registering thermometers read and set at 11 P. M., at the Signal Service stations; at 7 A. M. at other stations. For the ozone observations the test paper was exposed from 7 A. M. to 2 P. M. for the day observation, and from 9 P. M. to 7 A. M. for the night observation. The velocity of wind was recorded by registering anemometers. These subjects are treated by months in 1882 and for previous years, in an article on Meteorological Conditions in Michigan in 1882, on pages 121-196 of this Report.

EXHIBIT 46.—BRONCHITIS.—*Stating for the Year and for each Month of the Year, 1882, what Per Cent of the Weekly Reports of Diseases Stated Presence of Bronchitis, and what were the Meteorological Conditions, as Observed at Stations in Michigan.* (See Propositions 1, 2, and 3, pages 225-226.)*

MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS STATING PRESENCE OF.		BRONCHITIS.		TEMPERATURE, F.		HUMIDITY of Air. § Av. of 3 Daily Observations.		VAPOR Inhal'd and Exhaled, from Air Passages, by one Person in 24 Hours.		OZONE.— Relative. Scale of 10°.		Av. Velocity of Wind, Miles per Hour, by Anemometer.	ATMOSPHERIC PRESSURE. Inches. Reduced to 32° Far.			
		Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present. †, ‡	Av. Daily Range, by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative, Per Cent of Saturation.	Absolute—Grs. of Vapor in a Cubic Foot of Air.	Inhaled. ||	Exhaled in Ex- cess of that Inhaled. ¶	Av. Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.		Night Observation, 9 P. M. to 7 A. M.	RANGE.		
														Monthly and for Year.	Av. Daily by 3 Daily Obser- vations. **	Average Pressure
More than Av. Per Cent of Bronchitis.	Mar...	75	2.8	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	1.292	.362	29.149
	Apr...	74	3.0	19.08	42.65	α 68	2.59	1.62	10.06	α 54	3.85	3.99	11.1	1.053	α .192	29.153
	Jan...	73	3.0	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	1.151	.338	29.186
	Nov...	71	3.1	α13.51	37.90	79	2.46	1.54	10.14	75	α 2.95	α 3.14	α 8.6	α .915	α .189	29.224
	Dec...	71	2.6	α12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	.997	.225	α29.135
	May...	70	2.9	19.55	551.04	α 67	3.30	2.06	9.62	α 56	3.79	3.10	10.1	α .810	α .158	α29.123
	Feb...	70	2.8	α16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	1.346	.330	α29.121
Average ..		65	3.3	17.43	47.14	76	c 3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138
Less than Av. Per Cent of Bronchitis.	June.	62	3.3	α20.33	64.43	71	5.20	3.25	8.43	53	α 3.47	3.34	8.7	.794	.163	29.001
	Oct. . .	59	3.6	α19.77	53.53	α 76	3.95	2.47	9.21	51	3.13	2.72	8.6	.767	.200	29.134
	Sept...	57	4.2	α19.31	61.70	α 77	5.03	3.14	8.54	44	2.88	2.40	7.5	.757	.148	α29.202
	July...	51	3.7	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	.573	.123	29.118
	Aug...	44	4.5	16.80	69.05	α 81	6.47	4.04	7.64	58	3.19	2.64	6.9	.525	.095	29.112

α An exception to the proposition that **more** than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was **greater** than the average for the year; and **less** in months when the same condition was **less** than the average. See proposition 1, relating to bronchitis, page 225.

β An exception to the proposition that **more** than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was **less** than the average for the year; and **less** in months when the same condition was **greater** than the average for the year. See proposition 2, relating to bronchitis, page 225.

c As regards absolute humidity, there is, for 1882, no exception to proposition 2, relating to bronchitis, pages 225-226.

* How many stations, and what stations, are represented in the statements for each meteorological subject may be seen by referring to Exhibit 45, page 223, in which the stations are named, and a statement for the year 1882, in relation to each meteorological subject, is given for each station included in the average for that subject. In Exhibit 45 is also stated what time the tri-daily observations were made at each station. Additional statements relative to meteorological conditions may be found in an article on the Principal Meteorological Conditions in Michigan in 1882, on pages 121-196 of this Report. Statements relative to the soil-moisture and ground water, by months in 1882, are given in Exhibits 4 and 5, and in summary foot-notes on pages 12-15.

† Explanations of statements in these columns, and other statements relative to the prevalence, in 1882, of the diseases under consideration, may be found in Tables 2, pp. 206-216, and 4, page 217, of this Report, and also in Diagrams 1, (p. 200), 2, 3, 4, and 5, on following pages. When the per cent of reports stated for any disease is the same for two months, or for any month is the same as the average, the order of months in the first column of these exhibits has been determined by reference to fractional per cents.

‡ Small numbers in this column indicate great prevalence in the localities where the disease occurred, as compared with other diseases; and large numbers a less prevalence.

§ Calculated from readings of dry bulb and wet bulb thermometers.

|| Calculated for 18 respirations per minute, of 20 cubic inches of air each. The numbers in this column are just five eighths of those in the next preceding column.

¶ Assuming the air exhaled to be saturated with vapor at the temperature of 98° F., in which

[Footnotes to Exhibit 46 are continued on page 225.]

and those in which more bronchitis than the average was reported being placed above the average line, the others below that line. The conditions for each month are printed, in the proper columns, in the line for the month. The statements being thus arranged, it is easy to see whether the temperature, the velocity of the wind, or any other condition represented, was above its average for the year in months when more than the average amount of bronchitis was reported, and in months when less bronchitis was reported. That the comparisons may the more readily be held in mind, propositions have been made concerning the relations of bronchitis to meteorological conditions (stated on page 224), grouping the conditions into two classes. The letters *a* and *b*, in the exhibit, mark exceptions to these propositions. It is not supposed that the propositions are in every case true; but they serve to bring out the evidence of the exhibit on the subject in question. This evidence is to be had by noting the number and force of the exceptions to the proposition, and also whether the exception is explained by facts shown in other columns. A summary of the evidence is presented in Exhibit 60, near the close of this article.

Similar exhibits and similar propositions relating to other diseases are given on following pages. To prevent confusion it has been thought best not to change the statement of the propositions to fit the evidence concerning each disease,—except that they are differently stated for the summer diseases (beginning with the exhibit on diarrhea) and for the winter diseases (beginning with that on bronchitis), a somewhat arbitrary classification of the diseases treated, but one useful for the present purpose.

RELATIONS OF BRONCHITIS TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.†—That in months when more than the average per cent of weekly reports stated the presence of Bronchitis the average daily range of temperature, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere were greater than the average for the year; and in months when less than the average per cent of reports stated the presence of Bronchitis these conditions were less than the average for the year. In Exhibit 46, page 224, the letter *a* marks exceptions to this proposition for the year 1882.

PROPOSITION 2.‡—That in months when more than the average per cent of weekly reports stated the presence of Bronchitis the average daily temperature, and the absolute humidity of the atmosphere were less than the average for the year; and in months when less than the average per cent of reports stated the presence of Bronchitis these conditions were greater than the average for the year. In Exhibit 46, page 224, the letter *b* marks exceptions to this proposition for months in 1882. As regards absolute humidity, there is, for 1882, no exception to Proposition 2, relating to Bronchitis.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 2, it is true also that the quantity of vapor inhaled daily was less than the average, and the quantity exhaled daily in excess of that inhaled was greater than the average, in months

case each cubic foot of air contains 18.69 grains of vapor, and 18 respirations per minute, of 20 cubic inches of air each, make 11.68 Troy ounces of vapor exhaled daily. No correction has been made for expansion of air after it is inhaled.

** The daily range from which numbers in this column were computed is the difference between the highest and the lowest of the four observations taken during the 24 hours, namely, at 7 A. M., 2 P. M., 9 P. M., of one day, and 7 A. M. of the following day, or at U. S. Signal Service Stations, at 7 A. M., 3 P. M., 11 P. M., and 7 A. M., Washington mean time, as stated in the * foot-note on page 134.

† Explanations are given above; and a summary in Exhibit 60, near the close of this article.

EXHIBIT 47.—SICKNESS FROM BRONCHITIS, 1877-82.—By Year and Months for each of the Six Years 1877-82, Stating on What Per Cent of the Weekly Reports Received Bronchitis was Reported Present, and Comparing the Per Cents for 1882 with the Averages for Corresponding Months in those Years.

YEARS, ETC.	Annual Av.	MONTHS.											
		Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average 6 Years 1877-82.....	62	79	79	78	72	61	52	40	39	48	54	69	74
1877.....	55	76	72	72	65	45	31	25	22	37	48	71	77
1878.....	64	77	75	74	71	65	56	41	45	55	60	73	81
1879.....	64	83	87	83	78	65	54	40	41	50	59	65	77
1880.....	64	81	84	82	68	59	57	44	45	46	57	67	72
1881.....	62	86	86	80	78	62	53	38	37	44	44	66	68
1882.....	65	73	70	75	74	70	62	51	44	57	59	71	71
In 1882 Greater than Av. 1877-82.....	3	-----	-----	-----	2	9	10	11	5	9	5	2	-----
In 1882 Less than Av. 1877-82.....	-----	6	9	3	-----	-----	-----	-----	-----	-----	-----	-----	3

when more than the average per cent of reports stated presence of Bronchitis; and that more vapor was inhaled and a less excess exhaled daily in months when the per cent of reports stating presence of Bronchitis was less than the average.

Proposition 3 would also hold true in relation to pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, and pulmonary consumption, treated in Exhibits 48, 50, 51, 52, and 53, on following pages.

What per cent of the weekly reports received in 1882 stated presence of bronchitis is graphically represented by months in Diagram 1, page 200.

The evidence of Exhibit 46 confirms that of similar exhibits relating to bronchitis in previous years.

What per cent of the reports received stated presence of bronchitis by months in each of the years 1877-82, also the average for those years, and a comparison of 1882 with that average are shown in Exhibit 47, above.

A close relation between bronchitis and cold weather is well brought out by a comparison of Exhibit 47, above, stating sickness from bronchitis by months in each of the years 1877-82, with Exhibit 17, page 132, stating the mean temperature by months in the same years. Bronchitis was reported in 1882 on a slightly greater proportion of the reports received than the average for the six years 1877-82. The mean temperature for 1882 was slightly below the average for those years. In January, February, and March, the mean temperature was above the average for those months in these six years, and bronchitis was reported on a less proportion than the average of the weekly reports. From April to September the mean monthly temperature was below the average for the six years 1877-82, and the proportion of reports stating presence of bronchitis was greater than the average for those years. In October and November the mean monthly temperature rose above the average, but the proportion of sickness reported from bronchitis continued above the average, perhaps as an effect of the preceding comparatively cold weather. In December both the average temperature and the sickness from bronchitis were below the average for the six years just named. In August, 1882, the mean temperature was below the average August temperature for the six years 1877-82, and the absolute humidity was greater than the average for those years. With this one exception in 1882, the mean monthly temperature and the absolute humidity

were above the average for the six years 1877-82, both in the same months (Jan., Feb., Mar., Oct., and Nov.), and both were below that average in the same months (Apr. to July, Sept. and Dec.). This appears by a comparison of Exhibits 17 and 21, pages 132 and 144.

RELATIONS OF PNEUMONIA AND OTHER DISEASES TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.*—That in months when more than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsilitis, influenza, scarlet fever, rheumatism, neuralgia, or pulmonary consumption), the average daily range of temperature, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere were greater than the average for the year; and in months when less than the average per cent of the reports stated the presence of pneumonia (or of the other diseases named), these conditions were less than the average for the year. In Exhibits 48-53, on page 228, and following pages, the letter *a* marks exceptions to this proposition for the year 1882.

PROPOSITION 2.—That in months when more than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsilitis, influenza, scarlet fever, rheumatism, neuralgia, or pulmonary consumption), the average daily temperature and the absolute humidity of the atmosphere were less than the average for the year; and in months when less than the average per cent of reports stated the presence of pneumonia (or of the other diseases named), these conditions were greater than the average for the year. In Exhibits 48-53, on page 228, and following pages, the letter *b* marks exceptions to this proposition for the year 1882.

What per cent of the weekly reports received in 1882 stated presence of pneumonia is graphically represented by months in Diagram 1, page 200. What per cent of the weekly reports received stated presence of pneumonia, and of other diseases mentioned in the two preceding paragraphs, Propositions 1 and 2, by months in the years 1877-82, is stated in Exhibit 49, page 229, where are also given an average for those years and a comparison of 1882 with that average.

Comparing Exhibit 49, page 229, relating to sickness from pneumonia in the six years 1877-82, with Exhibit 17, page 132, relating to temperature for the same years, it may be noted that there is a general correspondence (inversely) between the lines stating variations in 1882, from the average temperature for those years, and from the average sickness reported from pneumonia, the months in which the closest relation appears being January, February, March, May, June, and November. As regards the decrease in sickness from pneumonia in January, 1882, it should be noted that the mean temperature in December, 1881, was more than 6° F., above the average December temperature for the six years 1877-82; and it is generally true that changes in the rate of sickness from pneumonia occur in the month following the marked change in the temperature. Other examples of this are seen in the changes in temperature which occurred in the months of April and October, as shown in Exhibit 17, page 132, while the change in the sickness followed in May and November, as shown in Exhibit 49, relative to pneumonia.

* Explanations of Propositions 1 and 2 are printed on pages 222, 223. A summary statement is printed at the close of this article, in Exhibit 60.

EXHIBIT 48.—PNEUMONIA AND MEMBRANOUS CROUP.—*Stating for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports of Diseases Stated Presence of Pneumonia, also of Membranous Croup, and what were the Meteorological Conditions, as Observed at Stations in Michigan.**

PNEUMONIA.																
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS STATING PRESENCE OF.†		Per Cent of Weekly Re- ports Stating Presence of,† Av. Order of Prevalence where Present. †, ‡		TEMPERA- TURE, F.		HUMIDITY of Air. § Av. of 3 Daily Ob- servations.		VAPOR Inhal'd and Exhaled, from Air Passages, by one Person in 24 Hours.		OZONE,— Relative, Scale of 10°. 7 A. Night Observation, 9 P. M. to 7 A. M.		Av. Velocity of Wind, Miles per Hour, by Anemometer.		ATMOSPHERIC PRESSURE.		
														Inches. Reduced to 32° Fahr.		
														RANGE.		
														Monthly and for Year.	Av. Daily, by 3 Daily Obser- vations. **	Average Pressure.
More than Av. Per Ct. of Pneumonia.	Feb.	63	3.7	α16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	1.346	.330	α29.121
	Mar.	60	3.9	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	1.292	.362	29.149
	Apr.	58	4.2	19.08	42.65	68	2.59	1.62	10.06	α 54	3.85	3.99	11.1	1.053	α .192	29.153
	Jan.	58	4.1	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	1.151	.338	29.186
	Dec.	47	4.3	α12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	.997	.225	α29.135
	May	46	4.6	19.55	b51.04	α 67	3.30	2.06	9.62	α 56	3.79	3.99	10.1	α .810	α .158	α29.123
Average	39	4.4	17.43	47.14	76	3.48	2.18	9.50	61	3.41	c 3.50	c 9.6	.915	.211	29.138	
Less than Av. Per Ct. of Pneumonia.	June.	34	4.3	α20.33	64.43	71	5.20	3.25	8.43	53	α 3.47	3.34	8.7	.794	.163	29.001
	Nov.	33	4.7	13.51	b37.90	α 79	b 2.46	1.54	10.14	α 75	2.95	3.14	8.6	α .915	.189	α29.224
	Oct.	25	5.2	α19.77	53.53	α 76	3.95	2.47	9.21	51	3.13	2.72	8.6	.767	.200	29.134
	Sept.	19	5.5	α19.31	61.70	α 77	5.03	3.14	8.54	44	2.88	2.40	7.5	.757	.148	α29.202
	July.	17	5.5	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	.573	.123	29.118
	Aug.	12	5.6	16.80	69.05	α 81	6.47	4.04	7.64	58	3.19	2.64	6.9	.525	.095	29.112
CROUP, MEMBRANOUS.																
More than Av. Per Ct. of Mem. Croup.	Nov.	10	6.8	α13.51	37.90	79	2.46	1.54	10.14	75	α 2.95	α 3.14	α 8.6	α .915	α .189	29.224
	Jan.	10	6.4	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	1.151	.338	29.186
	Feb.	9	6.5	α16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	1.346	.330	α29.121
	Dec.	9	7.1	α12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	.997	.225	α29.135
	Oct.	9	6.2	19.77	b53.53	α 76	b 3.95	2.47	9.21	α 51	α 3.13	α 2.72	α 8.6	α .767	α .200	α29.134
	Mar.	8	6.0	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	1.292	.362	29.149
Average	7	7.0	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138	
Less than Av. Per Ct. of Mem. Croup.	Apr.	7	8.3	α19.08	b42.65	68	b 2.59	1.62	10.06	54	α 3.85	α 3.99	α 11.1	α 1.053	.192	α29.153
	May	6	7.4	α19.55	51.04	67	b 3.30	2.06	9.62	56	α 3.79	α 3.99	α 10.1	.810	.158	29.123
	Sept.	5	7.3	α19.31	61.70	α 77	5.03	3.14	8.54	44	2.88	2.40	7.5	.757	.148	α29.202
	June.	4	8.7	α20.33	64.43	71	5.20	3.25	8.43	53	α 3.47	3.34	8.7	.794	.163	29.001
	July.	3	9.0	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	.573	.123	29.118
	Aug.	3	8.7	16.80	69.05	α 81	6.47	4.04	7.64	58	3.19	2.64	6.9	.525	.095	29.112

* †, ‡, §, ||, ¶, ** See foot-notes with these marks in Exhibit 46, page 224.

α Exceptions to Proposition 1, relating to pneumonia or membranous croup, on page 227.

b Exceptions to Proposition 2, relating to pneumonia or membranous croup, on page 227.

c As regards night ozone and velocity of wind, there is, for 1882, no exception to Proposition 2, page 227, relating to pneumonia. Statements relating to these diseases for the years 1877-82 are given in Exhibit 49, page 229.

CROUP, TONSILITIS, INFLUENZA, AND RHEUMATISM.

As regards membranous croup, tonsilitis, influenza, and rheumatism, treated in Exhibit 49, page 229, there is also a marked correspondence between variations by months in 1882, from the average temperature for the same months in the six years 1877-82 (stated in Exhibit 17, page 132), and variations by months in 1882 from the average sickness from these diseases, reported for the same months in those years, the rule being that in months when the tempera-

ture was much below the average for the same months in those years, there was more than the average sickness from these diseases, and *vice versa*. In croup as in pneumonia, there is apparently a similar tendency for the change in sickness rate to lag behind the change in the temperature. A study of these diseases in relation to coincident weather is given in Exhibits 48, 50, 51, and 52.

EXHIBIT 49.—*By Year and Months for 1882 and an Average for the Six Years 1877-82,* Stating on What Per Cent of the Weekly Reports received PNEUMONIA, MEMBRANOUS CROUP, DIPHTHERIA, RHEUMATISM, INFUENZA, SCARLET FEVER, TONSILLITIS,* AND NEURALGIA* were Reported Present, and Comparing the Per Cents for Months in 1882 with the Averages for Corresponding Months in those Years.*

YEARS, ETC.		PER CENT OF REPORTS.†																										
		Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
PNEUMONIA.	Av. 6 yrs., 1877-82.	41	64	69	65	59	44	28	18	14	19	24	38	50	MEMBRANOUS CROUP.	7	13	10	9	8	5	4	2	2	4	6	10	12
	1881.....	41	69	73	62	61	51	28	18	14	19	21	36	47		9	16	19	13	9	5	5	4	4	5	6	11	11
	1882.....	39	58	63	60	58	46	34	17	12	19	25	33	47		7	10	9	8	7	6	4	3	3	5	9	10	9
	In 1882 Greater than Av. 1877-82.	—	—	—	—	—	2	6	—	—	—	—	1	—		—	—	—	—	—	1	—	1	1	1	3	—	—
	In 1882 Less than Av. 1877-82.	2	6	6	5	1	—	—	1	2	—	—	—	5		3	3	1	1	1	—	—	—	—	—	—	—	3
DIPHTHERIA.	Av. 6 yrs., 1877-82.	26	34	31	25	25	20	17	17	18	23	32	36	35	RHEUMATISM.	68	74	74	74	73	69	65	60	55	60	68	73	75
	1881.....	34	36	39	29	32	33	26	25	29	33	44	42	40		71	71	74	77	82	74	71	65	65	63	69	72	71
	1882.....	25	37	32	25	26	22	17	16	14	23	28	28	28		68	70	67	70	71	65	69	66	61	62	70	71	74
	In 1882 Greater than Av. 1877-82.	—	3	1	—	1	2	—	—	—	—	—	—	—		—	—	—	—	—	4	6	6	2	2	—	—	—
	In 1882 Less than Av. 1877-82.	1	—	—	—	—	—	—	1	4	—	4	8	7		4	7	4	2	4	—	—	—	—	—	—	2	1
INFUENZA.	Av. 6 yrs., 1877-82.	41	58	64	60	52	37	28	20	21	27	33	43	51	SCARLATINA.	20	26	27	26	24	21	18	15	13	14	18	20	21
	1881.....	35	57	64	59	52	30	19	9	16	17	18	34	42		19	25	30	23	27	23	19	16	12	11	13	13	16
	1882.....	40	48	51	52	47	40	33	21	19	33	40	44	52		18	22	24	23	19	15	22	14	10	12	15	19	18
	In 1882 Greater than Av. 1877-82.	—	—	—	—	—	3	5	1	—	6	7	1	1		—	—	—	—	—	4	—	—	—	—	—	—	—
	In 1882 Less than Av. 1877-82.	1	10	13	8	5	—	—	—	2	—	—	—	—		2	4	3	3	5	6	—	1	3	2	3	1	3
TONSILLITIS*.	Av. 4 yrs., 1879-82.	48	60	62	60	52	44	41	29	29	34	43	54	62	NEURALGIA*.	64	64	68	71	70	63	63	56	55	57	62	68	69
	1881.....	48	65	65	65	56	41	40	26	26	30	40	52	61		65	69	75	72	72	64	63	55	54	57	58	67	67
	1882.....	48	57	59	53	52	47	43	35	31	37	45	54	65		68	69	67	69	73	71	69	64	61	64	64	74	72
	In 1882 Greater than Av. 1879-82.	—	—	—	—	—	3	2	6	2	3	2	—	3		4	5	—	—	3	8	6	8	6	7	2	6	3
	In 1882 Less than Av. 1879-82.	—	3	3	7	—	—	—	—	—	—	—	—	—		—	—	—	1	2	—	—	—	—	—	—	—	—

* The average line for tonsillitis and neuralgia includes only the four years 1879-82.

† Other statements for 1882 and months in 1882, relative to these diseases are given in Table 2, pages 206-217, and in Exhibits 48, 50, 51, and 52, pages 228, 231, 232, and 233, where are also given for convenient comparison statements of coincident meteorological conditions. The lines for 1882 are graphically represented in Diagrams 1, page 200, 2, page 230, and 4, on a following page.

DIAGRAM 2 —WEEKLY REPORTS OF DISEASES IN MICHIGAN, IN 1882.

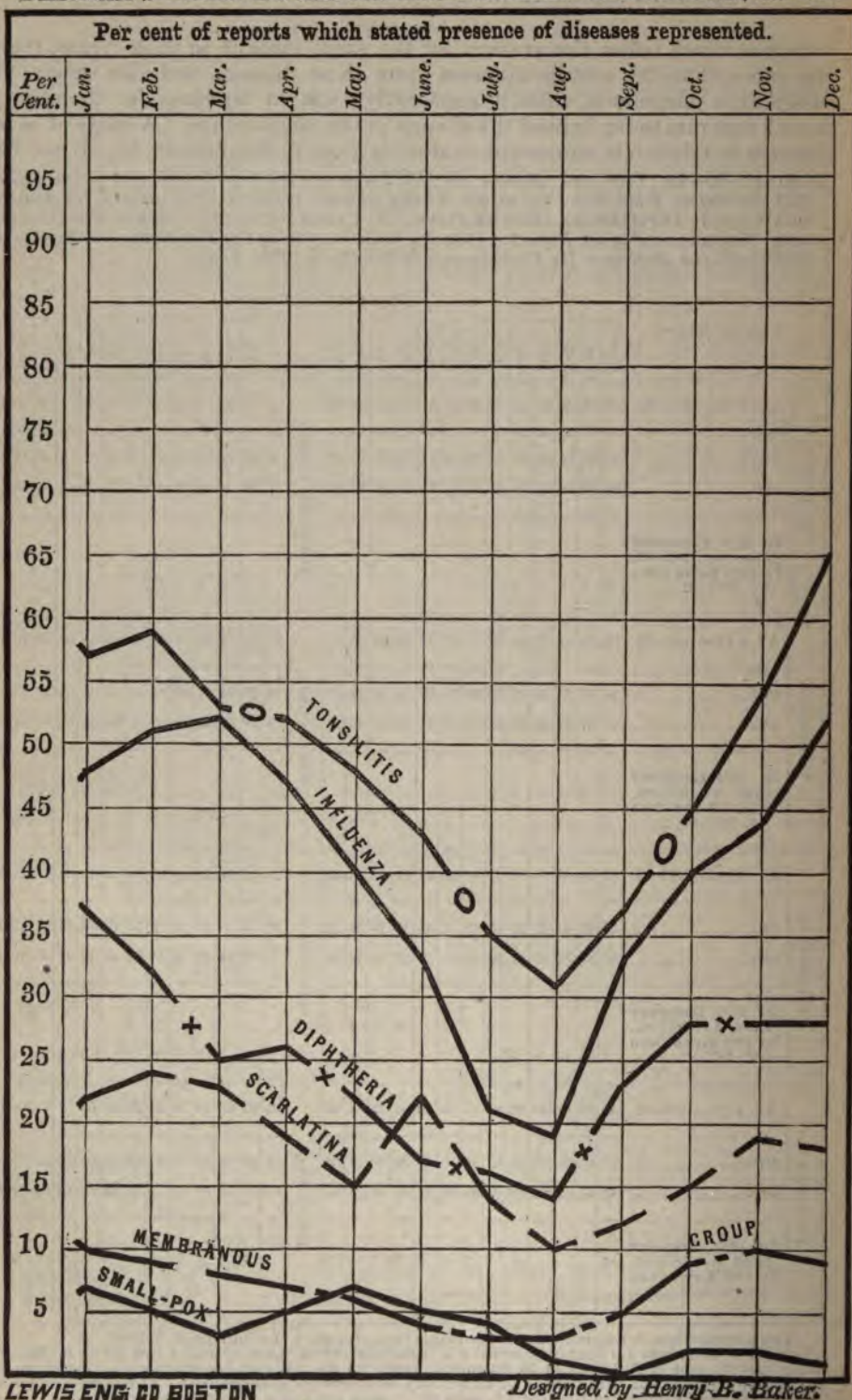


EXHIBIT 50.—DIPHTHERIA AND TONSILITIS.—*Stating for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports of Diseases Stated Presence of Diphtheria, also of Tonsillitis, and what were the Meteorological Conditions, as observed at Stations in Michigan.**

DIPHTHERIA.				TEMPERATURE, F.		HUMIDITY of Air, § Av. of 3 Daily Ob- servations.		VAPOR Inhal'd and Exhaled, from Air Passages, by one Per- son in 24 Hours.		OZONE,— Relative, Scale of 10°.		ATMOSPHERIC PRESSURE. Inches Reduced to 32° Fahr.				
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS STATING PRESENCE OF, †		Per Cent of Weekly Re- ports Stating Presence of, †	Av. Order of Prevalence where Present. †, ‡	Average of Three Daily Observations.		Relative, Per Cent of Saturation.	Absolute,—Grs. of Vapor in a Cubic Foot of Air.	Inhaled. ||	Exhaled in Ex- cess of that Inhaled. ¶	Av. Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles Per Hour, by Anemometer.	RANGE.		
				Av. Daily Range, by Reg- istering Thermometers.									Monthly and for Year.	Av. Daily, by 3 Daily Obser- vations. **	Average Pressure.	
More than Av. Per Cent of Diphtheria.		Jan...	37	4.4	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.51	.338	29.186
		Feb...	32	4.6	α16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	.330	α29.121
		Oct...	28	4.3	19.77	b53.53	α76	b3.95	2.47	9.21	α51	α3.13	α2.72	α8.6	α.200	α29.134
		Nov...	28	4.3	α13.51	37.90	79	2.46	1.54	10.14	75	α2.95	α3.14	α8.6	α.189	29.224
		Dec...	28	4.7	α12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	.997	.225	α29.135
		Apr...	26	4.9	19.08	42.65	α68	2.59	1.62	10.06	α54	3.85	3.99	11.1	α.192	29.153
		Mar...	25	4.7	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	1.292	.362	29.149
Average...			25	4.8	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	.915	.211	29.138
Less than Av. Per Cent of Diphtheria.		Sept...	23	4.7	α19.31	61.70	α77	5.03	3.14	8.54	44	2.88	2.40	.757	.148	α29.202
		May...	22	5.6	α19.55	51.04	67	b3.30	2.06	9.62	56	α3.79	α3.99	α10.1	.158	29.123
		June...	17	5.6	α20.33	64.43	71	5.20	3.25	8.43	53	α3.47	3.34	.794	.163	29.001
		July...	16	5.9	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	.573	.123	29.118
		Aug...	14	5.0	16.80	69.05	α81	6.47	4.04	7.64	58	3.19	2.64	.525	.095	29.112
TONSILLITIS.																
More than Av. Per Cent of Tonsillitis.		Dec...	65	3.4	α12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	.997	.225	α29.135
		Feb...	59	3.5	α16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	.330	α29.121
		Jan...	57	3.8	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	.338	29.186
		Nov...	54	3.6	α13.51	37.90	79	2.46	1.54	10.14	75	α2.95	α3.14	α8.6	α.189	29.224
		Mar...	53	3.6	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	.362	29.149
		Apr...	52	3.7	19.08	42.65	α68	2.59	1.62	10.06	α54	3.85	3.99	11.1	.192	29.153
Average...			48	3.9	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	.915	.211	29.138
Less than Av. Per Cent of Tonsillitis.		May...	47	3.9	α19.55	51.04	67	b3.30	2.06	9.62	56	α3.79	α3.99	α10.1	.158	29.123
		Oct...	45	4.0	α19.77	53.53	α76	3.95	2.47	9.21	51	3.13	2.72	.767	.200	29.134
		June...	43	3.7	α20.33	64.43	71	5.20	3.25	8.43	53	α3.47	3.34	.794	.163	29.001
		Sept...	37	4.8	α19.31	61.70	α77	5.03	3.14	8.54	44	2.88	2.40	.757	.148	α29.202
		July...	35	4.5	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	.573	.123	29.118
		Aug...	31	4.9	16.80	69.05	α81	6.47	4.04	7.64	58	3.19	2.64	.525	.095	29.112

* †, ‡, §, ||, ¶, ** See foot-notes with these marks in Exhibit 46, page 224. a Exceptions to Proposition 1, relating to diphtheria or tonsillitis, on page 227. b An exception to Proposition 2, relating to diphtheria or tonsillitis, on page 227. c As regards average temperature, there is, for 1882, no exception to Proposition 2, relating to tonsillitis, page 227. Statements relating to these diseases for the years 1877-82 are given in Exhibit 49, page 229.

EXHIBIT 51.—INFLUENZA AND SCARLET FEVER.—*Stating for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports Stated Presence of Influenza, also of Scarlet Fever, and what were the Meteorological Conditions, as Observed at Stations in Michigan.**

INFLUENZA.																
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS STATING PRESENCE OF.†	Per Cent of Weekly Re- ports Stating Presence of.†	Av. Order of Prevalence where Present. †, ‡	TEMPERA- TURE, F.		HUMIDITY of Air. § Av. of 3 Daily Ob- servations.			VAPOR Inhal'd and Exhaled, from Air Passages by one Per- son in 24 Hours.		OZONE,— Relative, Scale of 10°	Miles per Hour, by Anemometer.	ATMOSPHERIC PRESSURE. Inches. Reduced to 32° Fahr.				
			Av. Daily Range, by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative, Per Cent of Saturation.	Absolute,—Grs. of Vapor in a Cubic Foot of Air.	Inhaled. ||	Exhaled in Ex- cess of that Inhaled. ¶	Av. Per Cent of Cloudiness.			Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Monthly and for Year.	Av. Daily, by 3 Daily Obser- vations. **	Average Pressure.
More than Av. Per Cent of Influenza.	Mar. . .	52	2.4	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	1.292	.362	29.149
	Dec. . .	52	2.5	α12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	.997	.225	α29.135
	Feb. . .	51	2.4	α16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	1.346	.330	α29.121
	Jan. . .	48	2.9	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	1.151	.338	29.186
	April. .	47	2.6	19.08	42.65	α 68	2.59	1.62	10.06	α 54	3.85	3.99	11.1	1.053	α .192	29.153
	Nov. . .	44	3.1	α13.51	37.90	79	2.46	1.54	10.14	75	α 2.95	α 3.14	α 8.6	α .915	α .189	29.224
	Oct. . .	40	3.8	19.77	b53.53	α 76	b 3.95	2.47	9.21	α 51	α 3.13	α 2.72	α 8.6	α .767	α .200	α29.134
May. . .	40	2.9	19.55	b51.04	α 67	3.30	2.06	9.62	α 56	3.79	3.99	10.1	α .810	α .158	α29.123	
Average . . .	40	3.1	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138	
Less than Av. Pr. Ct. of Infl.	Sept. . .	33	3.5	α19.31	61.70	α 77	5.03	3.14	8.54	44	2.88	2.40	7.5	.757	.148	α29.202
	June. . .	33	3.5	α20.33	64.43	71	5.20	3.25	8.43	53	α 3.47	3.34	8.7	.794	.163	29.001
	July. . .	21	5.1	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	.573	.123	29.118
	Aug. . .	19	4.4	16.80	69.05	α 81	6.47	4.04	7.64	58	3.19	2.64	6.9	.525	.095	29.112
SCARLATINA.																
More than Av. Per Cent of Scarlatina.	Feb. . .	24	4.8	α16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	1.346	.330	α29.121
	Mar. . .	23	4.7	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	1.292	.362	29.149
	Jan. . .	22	5.0	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	1.151	.338	29.186
	June. . .	22	4.9	20.33	b64.43	71	b 5.20	3.25	8.43	α 53	3.47	α 3.34	α 8.7	α .794	α .163	α29.001
	April. .	19	6.0	19.08	42.65	α 68	2.59	1.62	10.06	α 54	3.85	3.99	11.1	1.053	α .192	29.153
	Nov. . .	19	4.1	α13.51	37.90	79	2.46	1.54	10.14	75	α 2.95	α 3.14	α 8.6	α .915	α .189	29.224
Dec. . .	18	4.6	α12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	.997	.225	α29.135	
Average . . .	18	4.9	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138	
Less than Av. Per Ct. of Scarlatina.	May. . .	15	4.9	α19.55	51.04	67	b 3.30	2.06	9.62	56	α 3.79	α 3.99	α 10.1	.810	.158	29.123
	Oct. . .	15	4.4	α19.77	53.53	α 76	3.95	2.47	9.21	51	3.13	2.72	8.6	.767	.200	29.134
	July. . .	14	5.3	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	.573	.123	29.118
	Sept. . .	12	4.8	α19.31	61.70	α 77	5.03	3.14	8.54	44	2.88	2.40	7.5	.757	.148	α29.202
Aug. . .	10	6.0	16.80	69.05	α 81	6.47	4.04	7.64	58	3.19	2.64	6.9	.525	.095	29.112	

* †, ‡, §, ||, ¶. See foot-notes with these marks in Exhibit 46, page 224.

Proposition 1, relating to influenza or scarlet fever, on page 227.

2, relating to influenza and scarlet fever, on page 227.

for the years 1877-82, are given in Exhibit 49, page 229.

α Exceptions to

Proposition 1, relating to influenza or scarlet fever, on page 227.

b Exceptions to Proposition

2, relating to influenza and scarlet fever, on page 227.

Statements relating to these diseases

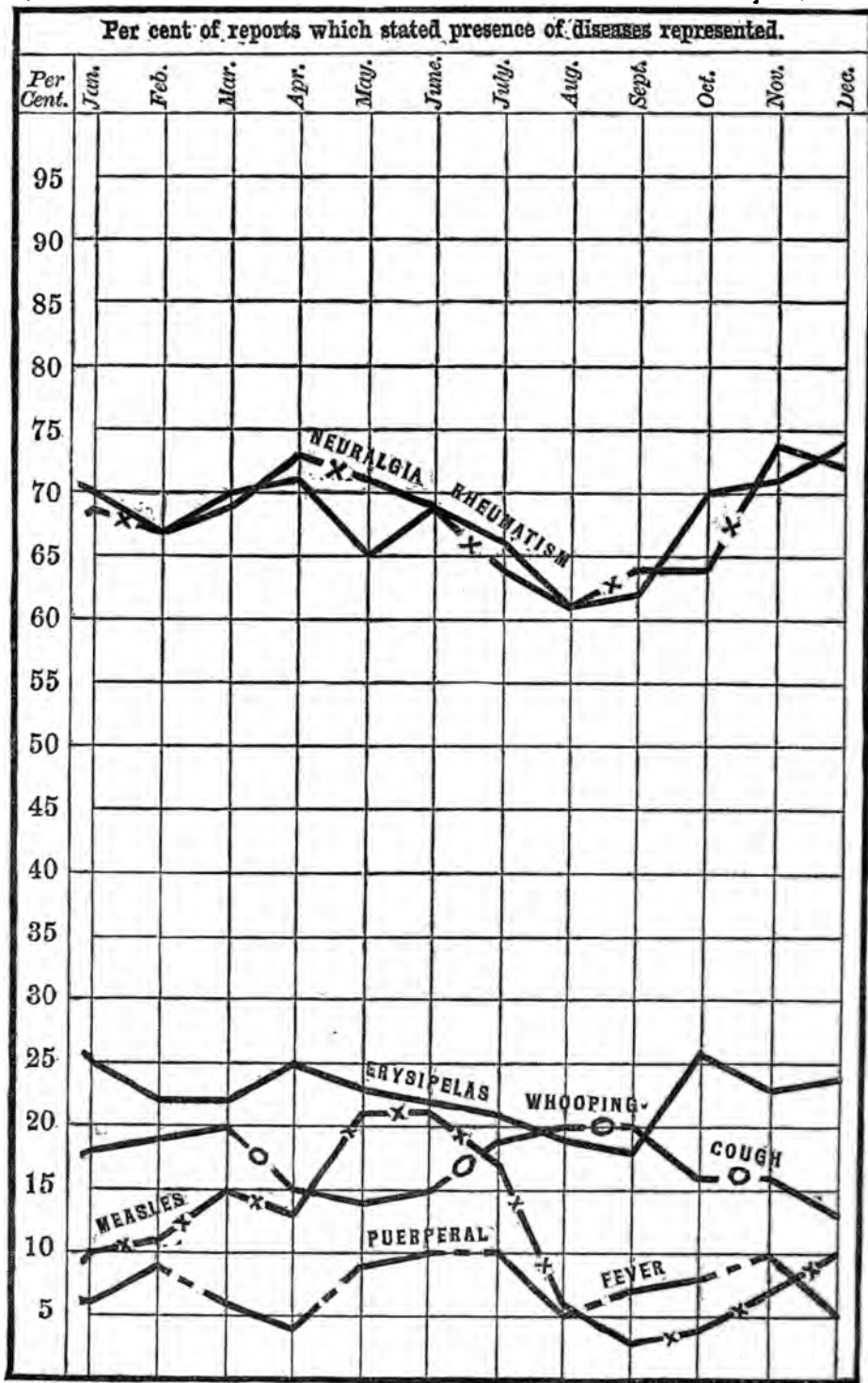
EXHIBIT 52.—RHEUMATISM AND NEURALGIA.—*Stating, for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports of Diseases Stated Presence of Rheumatism, also of Neuralgia, and what were the Meteorological Conditions, as Observed at Stations in Michigan.**

RHEUMATISM.				TEMPERATURE, F.		HUMIDITY of Air, § Av. of 3 Daily Observations.		VAPOR Inhal'd and Exhaled, from Air Passages, by one Person in 24 Hours.		OZONE,—Relative. Scale of 10°.		ATMOSPHERIC PRESSURE. Inches. Reduced to 32° Fahr.				
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS STATING PRESENCE OF.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present, †, ‡	Av. Daily Range, by Registering Thermometers.	Average of Three Daily Observations.	Relative, Per Cent of Saturation.	Absolute—Grav. of Vapor in a Cubic Foot of Air.	Inhaled. ||	Exhaled in Excess of that Inhaled. ¶	Av. Per Cent of Cloudiness.	Scale of 10°.		Av. Velocity of Wind, Miles Per Hour, by Anemometer.	RANGE.			
										Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Monthly and for Year.	Av. Daily, by 3 Daily Observations. **		
More than Av. Per Cent of Rheumatism.	Dec...	74	3.7	α12.43	25.73	82	1.59	.99	10.69	85	3.51	4.08	10.1	.997	.225	α29.135
	Nov...	71	3.7	α13.51	37.90	79	2.46	1.54	10.14	75	α 2.95	α 3.14	α 8.6	α .915	α .189	29.224
	Apr...	71	3.8	19.08	42.65	α 68	2.59	1.62	10.06	54	3.85	3.99	11.1	1.053	α .192	29.153
	Jan...	70	3.7	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	1.151	.338	29.186
	Oct...	70	4.1	19.77	b53.53	α 76	b 3.95	2.47	9.21	α 51	α 3.13	α 2.72	α 8.6	α .767	.200	α29.134
	Mar...	70	3.8	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	1.292	.362	29.149
	June.	69	3.5	20.33	b64.43	α 71	b 5.20	3.25	8.43	α 53	α 3.47	α 3.34	α 8.7	α .794	α .163	α29.001
Average..	68	3.8	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138	
Less than Av. Per Ct. of Rheumatism.	Feb.	67	3.9	16.52	b33.42	α 77	b 2.03	1.27	10.41	α 62	α 3.75	α 4.20	α 11.7	α1.346	α .330	29.121
	July..	66	3.7	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	.573	.123	29.118
	May..	65	3.6	α19.55	51.04	67	b 3.30	2.06	9.62	56	α 3.79	α 3.99	α 10.1	.810	.158	29.123
	Sept..	62	4.5	α19.31	61.70	α 77	5.03	3.14	8.54	44	2.88	2.40	7.5	.757	.148	α29.202
	Aug..	61	4.2	16.80	69.05	α 81	6.47	4.04	7.64	58	3.19	2.64	6.9	.525	.095	29.112
NEURALGIA.																
More than Av. Per Cent of Neuralgia.	Nov...	74	3.4	α13.51	37.90	79	2.46	1.54	10.14	75	α 2.95	α 3.14	α 8.6	α .915	α .189	29.224
	Apr...	73	3.4	19.08	42.65	α 68	2.59	1.62	10.06	α 54	3.85	3.99	11.1	1.053	α .192	29.153
	Dec...	72	3.2	α12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	.997	.225	α29.135
	May..	71	3.4	19.55	b51.04	α 67	3.30	2.06	9.62	α 56	3.79	3.99	10.1	α .810	α .158	α29.123
	June.	69	3.4	20.33	b64.43	α 71	b 5.20	3.25	8.43	α 53	α 3.47	α 3.34	α 8.7	α .794	α .163	α29.001
	Mar...	69	3.6	α15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	1.292	.362	29.149
	Jan...	69	3.5	α15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	1.151	.338	29.186
Average..	68	3.6	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138	
Less than Av. Per Ct. of Neuralgia.	Feb...	67	3.7	16.52	b33.42	α 77	b 2.03	1.27	10.41	α 62	α 3.75	α 4.20	α 11.7	α1.346	α .330	29.121
	Oct...	64	4.1	α19.77	53.53	α 76	3.95	2.47	9.21	51	3.13	2.72	8.6	.767	.200	29.134
	July..	64	3.7	α20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	.573	.123	29.118
	Sept..	64	4.3	α19.31	61.70	α 77	5.03	3.14	8.54	44	2.88	2.40	7.5	.757	.148	α29.202
	Aug..	61	3.8	16.80	69.05	α 81	6.47	4.04	7.64	58	3.19	2.64	6.9	.525	.095	29.112

*, †, ‡, §, ||, ¶, ** See foot-notes with these marks in Exhibit 46, page 224. α Exceptions to Proposition 1, relating to Rheumatism or Neuralgia, on page 227. β Exceptions to Proposition 2, relating to Rheumatism or Neuralgia, on page 227.

Statements relating to these diseases for the years 1877-82 are given in Exhibit 49, page 229.

DIAGRAM 4.—WEEKLY REPORTS OF DISEASES IN MICHIGAN, IN 1892.



LEWIS ENG CO BOSTON

Designed by Henry B. Baker.

EXHIBIT 53.—PULMONARY CONSUMPTION.—*Stating for the Year and for each Month of the Year, 1882, what Per Cent of the Weekly Reports of Diseases Stated Presence of Pulmonary Consumption, and what were the Meteorological Conditions, as Observed at Stations in Michigan.**

		CONSUMPTION.				TEMPERATURE, F.		HUMIDITY		VAPOR		OZONE,—		ATMOSPHERIC PRESSURE.															
		MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS OF WEEKLY REPORTS STATING PRESENCE OF.				Av. Daily Range, by Registering Thermometers.		Av. of 3 Daily Observations.		Inhal'd and Exhaled, from Air Passages, by one Person in 24 Hours.		Relative. Scale of 10°.																	
More than Av. Per Cent of Pul. Consumption.		Per Cent of Weekly Reports Stating Presence of.				Average of Three Daily Observations.		Relative, Per Cent of Saturation.		Inhaled. ¶		Exhaled in Excess of that Inhaled. ¶		Av. Per Cent of Cloudiness.		Day Observation, 7 A. M. to 2 P. M.		Night Observation, 9 P. M. to 7 A. M.		Av. Velocity of Wind, Miles per Hour, by Anemometer.		Range.		Monthly and for Year.		Av. Daily by 3 Daily Observations. **		Average Pressure.	
		Av. Order of Prevalence where Present. †, ‡						Absolute — Grs. of Vapor in a Cubic Foot of Air.																					
More than Av. Per Cent of Pul. Consumption.	May...	69	4.4	19.55	b51.04	a 67	3.30	2.06	9.62	a 56	3.79	3.99	10.1	a .810	a .158	a29.123													
	Feb...	68	4.7	a16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	1.346	.330	a29.121													
	July...	67	4.2	20.25	b67.84	a 70	b 5.52	3.45	8.23	a 44	a 2.94	a 2.67	a 8.5	a .573	a .123	a29.118													
	June...	66	4.1	20.33	b64.43	a 71	b 5.20	3.25	8.43	a 53	3.47	a 3.34	a 8.7	a .794	a .163	a29.001													
	Mar...	66	4.7	a15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	1.292	.362	29.149													
	Jan...	66	4.9	a15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	1.151	.338	29.186													
Average ..	Apr...	66	5.1	19.08	42.65	a 68	2.59	1.62	10.06	a 54	3.85	3.99	11.1	1.053	a .192	29.153													
		66	4.6	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138													
Less than Av. Per Ct. of Consumpt'n.	Dec...	65	4.3	12.43	b25.72	a 82	b 1.59	.99	10.69	a 85	a 3.51	a 4.08	a 10.1	a .997	a .225	29.135													
	Oct...	65	4.6	a19.77	53.53	a 76	3.95	2.47	9.21	51	3.13	2.72	8.6	.767	.200	29.134													
	Sept...	63	4.7	a19.31	61.70	a 77	5.03	3.14	8.54	44	2.88	2.40	7.5	.757	.148	a29.202													
	Aug...	63	4.3	16.80	69.05	a 81	6.47	4.04	7.64	58	3.19	2.64	6.9	.525	.095	29.112													
	Nov...	62	4.7	13.51	b37.90	a 79	b 2.46	1.54	10.14	a 75	2.95	3.14	8.6	a .915	.189	a29.224													

* †, ‡, §, ¶, ** See foot-notes with these marks in Exhibit 46, page 224. See also page 237.

α Exceptions to proposition 1, relating to pulmonary consumption, on page 227.

b Exceptions to proposition 2, relating to pulmonary consumption, on page 227.

RELATIONS OF DIARRHEA TO METEOROLOGICAL CONDITIONS.

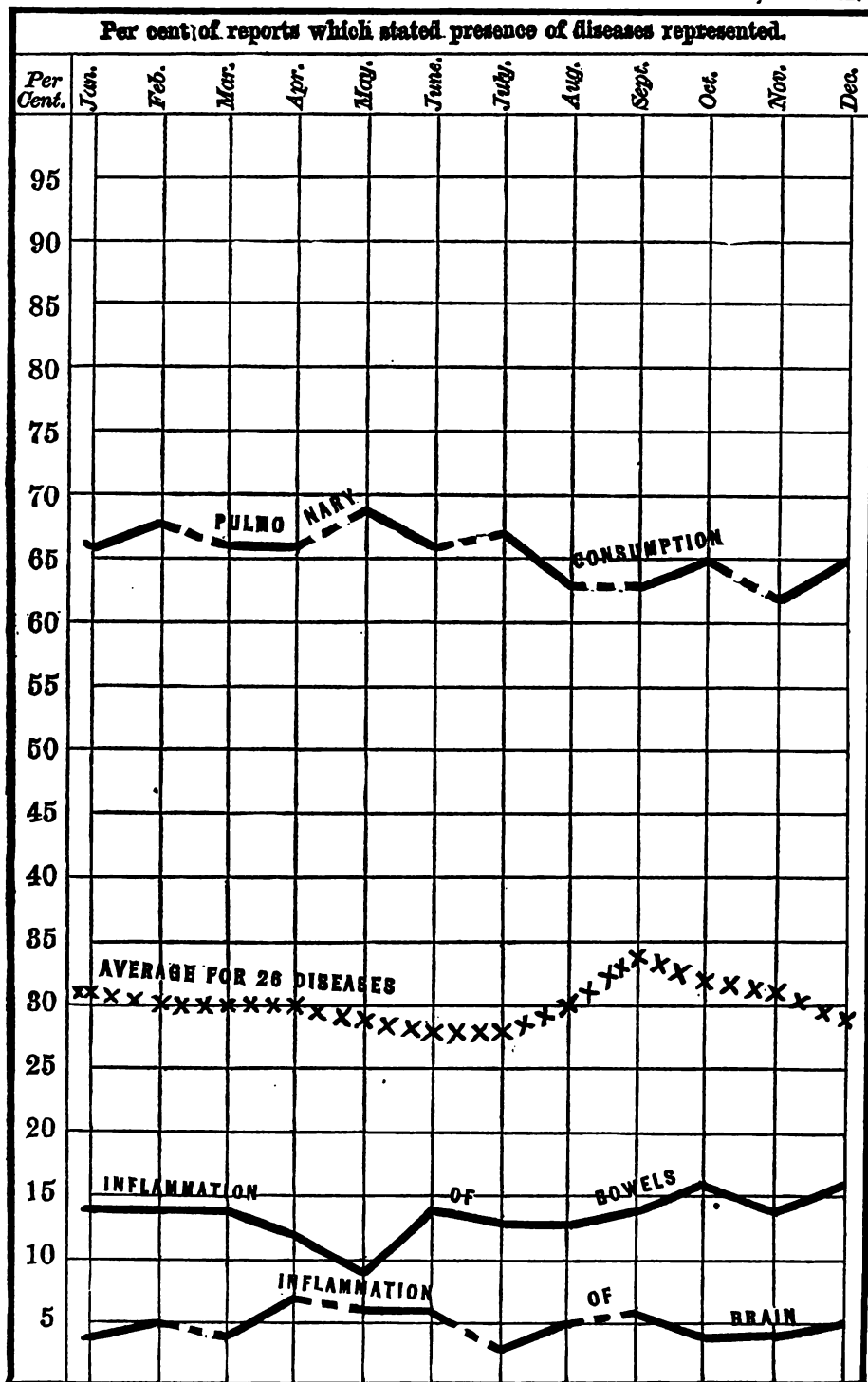
PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the average daily range of temperature, the average daily temperature, the absolute humidity of the atmosphere, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **less** than the average for the year. In Exhibit 55, page 238, the letter *a* marks exceptions to this proposition for the year 1882.

Explanations of propositions 1 and 2 are given on pages 222 and 225, and a summary of the evidence in Exhibit 55 is given in Exhibit 61, page 247.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, and the average velocity of the wind were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea,

[Continued on page 237.]

DIAGRAM 5—WEEKLY REPORTS OF DISEASES IN MICHIGAN, IN 1882.



LEWIS ENG CO BOSTON

Designed by Henry B. Baker.

EXHIBIT 54.—SICKNESS FROM CONSUMPTION, 1878-82.—By Year and Months for each of the Five Years 1878-82, Stating on what Per Cent of the Weekly Reports Received CONSUMPTION was Reported Present, and Comparing the Per Cents for 1882 with the Averages for Corresponding Months in those Years. (See page 235.)

YEARS, ETC.	Annual Av.	MONTHS.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average for 5 years 1878-82*.....	69	69	71	71	73	71	69	67	65	67	69	69	67
1877*.....	52	50	47	47	53	49	50	43	35	38	54	68	65
1878.....	71	67	72	76	75	72	68	68	65	70	73	73	71
1879.....	70	71	71	69	77	74	73	69	67	67	69	67	64
1880.....	68	65	69	70	72	70	69	66	62	66	66	68	70
1881.....	71	74	76	73	76	69	68	67	67	70	73	74	67
1882.....	66	66	68	66	66	69	66	67	63	63	65	62	65
In 1882 Greater than Av. 1878-82.....													
In 1882 Less than Av. 1878-82.....	3	3	3	5	7	2	3	=	2	4	4	7	2

* As consumption was not printed on the first blanks, nor on all used in 1877, that year is excluded from the average line. The line for the year 1877 is incorrectly printed in Exhibit 60, page 560 of the Report for 1882, the line there printed for 1877 being an average for the five years 1877-81.

[Continued from page 235.]

when less than the average per cent of reports stated the presence of diarrhea, these conditions were **greater** than the average for the year. In Exhibit 55, page 238, the letter *b* marks exceptions to this proposition for 1882.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to proposition 1, it is true also that the quantity of vapor inhaled daily was **greater** than the average, and the quantity exhaled daily in excess of that inhaled was **less** than the average, in months when more than the average per cent of reports stated presence of diarrhea; and that less vapor was inhaled and a **greater** excess exhaled daily in months when the per cent of reports stating presence of diarrhea was **less** than the average.

Proposition 3 is true also in relation to cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, and whooping-cough, treated in Exhibits 55, 57, 58, and 59, page 238, and following pages.

On what per cent of the weekly reports received, by months in the six years 1877-82, the eight foregoing diseases were reported present is stated in Exhibit 56, page 241. In Diagram 1, page 200, is graphically represented by months what per cent of the reports in each month in 1882 stated the presence of diarrhea.

In a comparison of the exhibit relating to sickness from diarrhea in 1882 and previous years (56, page 241) with that relating to temperature in those years (17, page 132), the most striking correspondence noted is that the temperature and the sickness reported from diarrhea for July, August, and September were both below the average for those months for the six years 1877-82. It seems reasonable that there may be a causal relation between these facts. In certain other months in 1882 (as Jan., Feb., March, Oct., and Nov.,) the mean temperature was above the average for those months (in the six years 1877-82), and there was more than the average sickness from diarrhea in those months of the same six years.

EXHIBIT 55.—DIARRHEA AND CHOLERA INFANTUM.—*Stating, for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports of Diseases Stated Presence of Diarrhea, also of Cholera Infantum, and what were the Meteorological Conditions, as Observed at Stations in Michigan.**

DIARRHEA.			TEMPERATURE, F.		HUMIDITY of Air. §		VAPOR Inhal'd and Exhaled, from Air Passages, by one Person in 24 Hours.		OZONE,—Relative. Scale of 10°.		ATMOSPHERIC PRESSURE. Inches. Reduced to 32° Fahr.					
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS OF STATING PRESENCE OF. †	Per Cent of Weekly Reports Stating Presence of. †	Av. Order of Prevalence where Present. ‡	Av. Daily Range, by Registering Thermometers.	Average of Three Daily Observations.	Relative, Per Cent of Saturation.	Absolute—Grs. of Vapor in a Cubic Foot of Air.	Inhaled. ||	Exhaled in Excess of that Inhaled. ¶	Av. Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles Per Hour, by Anemometer.	RANGE.		Average Pressure.	
													Monthly and for Year.	Av. Daily, by 3 Daily Observations. **		
More than Av. Per Cent.	Sept...	80	2.7	19.31	61.70	b 77	5.03	3.14	8.54	44	2.88	2.40	7.5	a .757	a .148	29.202
	Aug...	78	2.3	a16.80	69.05	b 81	6.47	4.04	7.64	58	3.19	2.64	6.9	a .525	a .095	a29.112
	Oct...	66	3.3	19.77	53.53	b 76	3.95	2.47	9.21	51	3.13	2.72	8.6	a .767	a .200	a29.134
	July...	60	2.8	20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	a .573	a .123	a29.118
	Average...	48	3.8	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138
Less than Av. Per Cent of Diarrhea.	June...	45	3.9	a20.33	a64.43	b 71	a 5.20	3.25	8.43	b 53	3.47	b 3.34	b 8.7	.794	.163	29.001
	Apr...	41	4.6	a19.08	42.65	b 68	2.59	1.62	10.06	b 54	3.85	3.99	11.1	a1.053	.192	a29.153
	Nov...	40	4.5	13.51	37.90	79	2.46	1.54	10.14	75	b 2.95	b 3.14	b 8.6	a .915	.189	a29.224
	May...	39	4.7	a19.55	a51.04	b 67	3.30	2.06	9.62	b 56	3.79	3.99	10.1	.810	.158	29.123
	Jan...	34	4.8	15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	a1.151	a .338	a29.186
	Mar...	31	4.7	15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	a1.292	a .362	a29.149
	Feb...	31	5.2	16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	a1.346	a .330	29.121
	Dec...	29	4.7	12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	a .997	a .225	29.135
	Average...	12	4.9	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138
CHOLERA INFANTUM.																
More than Av. Per Cent.	Aug...	41	3.8	a16.80	69.05	b 81	6.47	4.04	7.64	58	3.19	2.64	6.9	a .525	a .095	a29.112
	Sept...	40	4.2	19.31	61.70	b 77	5.03	3.14	8.54	44	2.88	2.40	7.5	a .757	a .148	29.202
	Oct...	20	5.0	19.77	53.53	b 76	3.95	2.47	9.21	51	3.13	2.72	8.6	a .767	a .200	a29.134
	July...	17	5.0	20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	a .573	a .123	a29.118
	Average...	12	4.9	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138
Less than Av. Per Cent of Cholera Infantum.	June...	9	5.0	a20.33	a64.43	b 71	a 5.20	3.25	8.43	b 53	3.47	b 3.34	b 8.7	.794	.163	29.001
	Nov...	5	7.9	13.51	37.90	79	2.46	1.54	10.14	75	b 2.95	b 3.14	b 8.6	a .915	.189	a29.224
	May...	2	9.2	a19.55	a51.04	b 67	3.30	2.06	9.62	b 56	3.79	3.99	10.1	.810	.158	29.123
	Mar...	2	11.4	15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	a1.292	a .362	a29.149
	Dec...	1	4.0	12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	a .997	a .225	29.135
	Feb...	1	8.5	16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	a1.346	a .330	29.121
	Jan...	1	5.0	15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	a1.151	a .338	a29.186
	Apr...	1	12.5	a19.08	42.65	b 68	2.59	1.62	10.06	b 54	3.85	3.99	11.1	a1.053	.192	a29.153

*. †. ‡. §. ||. ¶. ** See foot-notes with these marks in Exhibit 46, page 224. ♂ Exceptions to Proposition 1, relating to diarrhea or cholera infantum, on page 235, or page 239. ♀ Except tions to Proposition 2, relating to diarrhea or cholera infantum, on page 235, or page 239. ♂ Except Statements relative to these diseases for the years 1877-82 are given in Exhibit 56, page 241.

RELATIONS OF CHOLERA INFANTUM AND OTHER DISEASES TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, or whooping-cough), the average daily range of temperature, the average daily temperature, the absolute humidity of the atmosphere, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of cholera infantum (or of the other disease named), these conditions were **less** than the average for the year. In Exhibit 55, page 238, the letter *a* marks exceptions to this proposition for the year 1882.

Explanations of Propositions 1 and 2 are given on pages 222, 225; and a summary of the evidence of Exhibit 55 is given in Exhibit 61, page 247.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, or whooping cough), the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, and the average velocity of the wind were **less** than the average for the year; and that in months when **less** than the average per cent of reports stated the presence of cholera infantum (or of the other disease named), these conditions were **greater** than the average for the year. In Exhibit 55, page 238, the letter *b* marks exceptions to this proposition for 1882.

What per cent of all the weekly reports of sickness in each month in 1882 stated presence of cholera infantum is graphically represented by months in Diagram 1, page 200. What per cent of the reports received, by months in the six years 1877–82, stated presence of cholera infantum, and of the other diseases mentioned in the two preceding paragraphs, Propositions 1 and 2, is stated in Exhibit 56, page 241.

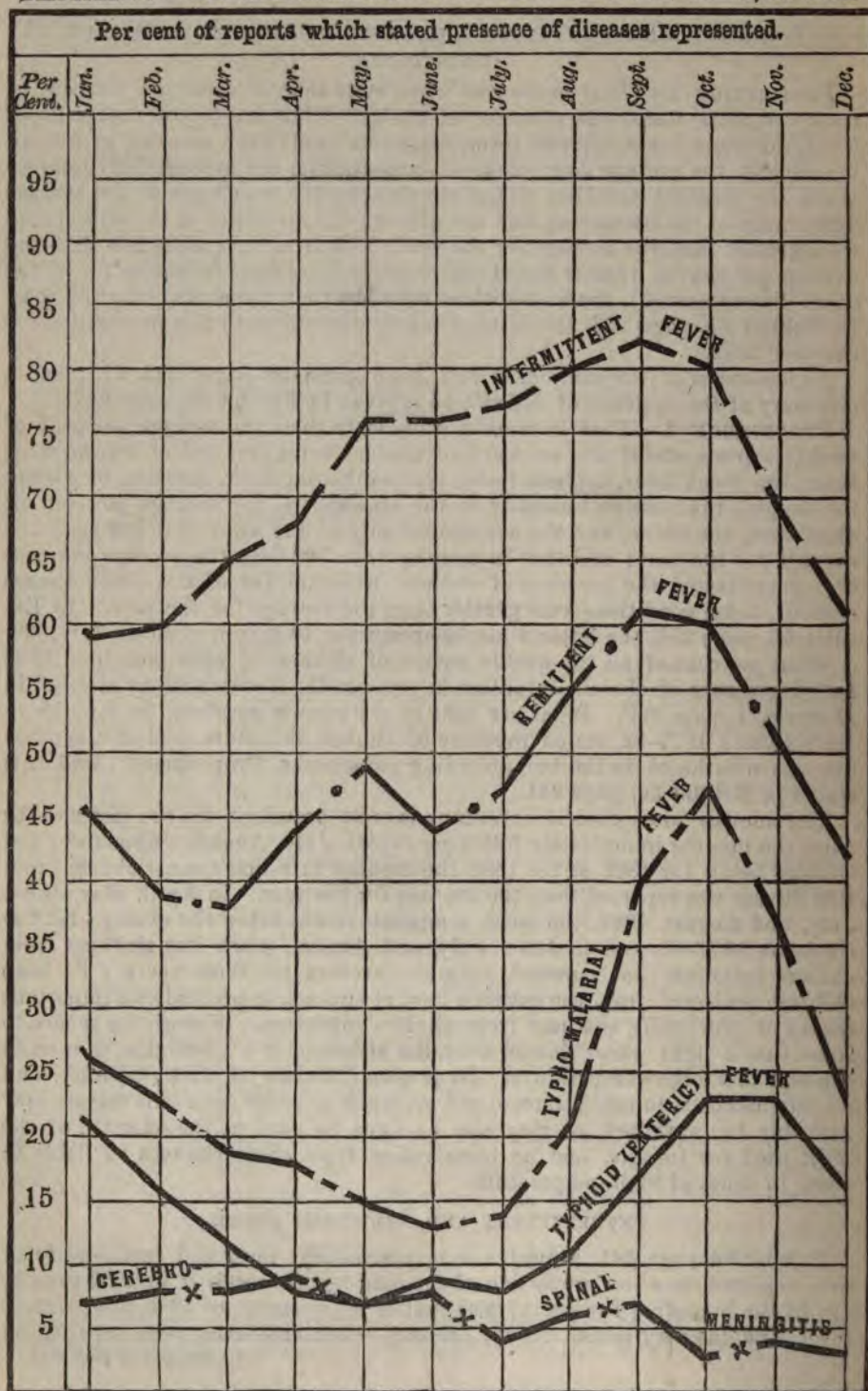
The months when cholera infantum is most prevalent are the hot months (and the months immediately following those), July, August, September, and October being for 1882 as for 1881 the months in which more sickness from this disease was reported than the average for the year. In April, May, June, July, and August, 1882, the mean temperature was below the average for the six years 1877–82, and in June, July, and August, much less sickness from cholera infantum was reported than the average for those years. To keep children protected from the extreme heat of summer is probably an important means of preventing sickness from cholera infantum. Experience seems to show that a light warm flannel over the abdomen is a protection to a child exposed to a high temperature. By proper attention to dress, bathing, and keeping children in cool rooms or places, much sickness from this disease may probably be prevented, as may also be done by care in the selection of the milk used for infants, and its preservation from those changes so liable to occur in times of high temperature.

INTERMITTENT AND REMITTENT FEVER.

Exhibit 56, page 241, indicates that intermittent fever and remittent fever were reported on a less proportion of the card-reports received in 1882 than in any of the preceding five years; also that in every month of 1882, intermittent fever, and in every month except January, remittent fever, were reported on

[Continued on page 243.]

DIAGRAM 3—WEEKLY REPORTS OF DISEASES IN MIC IGAN, IN 1882.



LEWIS ENG. CO BOSTON

Designed by Henry B. Baker.

EXHIBIT 56.—By Year and Months for 1882 and an Average for the Six Years 1877–82, Stating on What Per Cent of the Weekly Reports received DIARRHEA, CHOLERA INFANTUM, INTERMITTENT FEVER, REMITTENT FEVER, TYPHOID FEVER, TYPHO-MALARIAL FEVER, MEASLES, AND WHOOPING-COUGH were Reported Present, and Comparing the Per Cents for 1882 with the Averages for Corresponding Months in those Years.

YEARS, ETC.		PER CENT OF REPORTS.*												
		Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
DIARRHEA.	Av. 6 yrs., 1877-82.	46	26	26	28	30	35	45	76	88	83	58	34	26
	1881.....	52	29	32	33	33	38	55	91	95	90	70	38	30
	1882.....	48	34	31	31	41	39	45	60	78	80	66	40	29
	In 1882 Greater than Av. 1877-82.	2	8	5	3	11	4	=	=	=	8	6	3	=
	In 1882 Less than Av. 1877-82.	=	=	=	=	=	=	16	10	3	=	=	=	=
INTERMITTENT FEVER.	Av. 6 yrs., 1877-82.	79	62	64	68	78	87	88	89	90	90	88	78	68
	1881.....	82	67	69	70	84	88	91	92	94	92	91	83	69
	1882.....	71	59	60	65	68	76	76	77	80	82	80	69	61
	In 1882 Greater than Av. 1877-82.	=	=	=	=	=	=	=	=	=	=	=	=	=
	In 1882 Less than Av. 1877-82.	8	3	4	3	10	11	12	12	10	8	8	9	7
TYPHOID FEVER.	Av. 6 yrs., 1877-82.	14	12	10	7	6	6	6	8	15	23	25	23	18
	1881.....	18	13	10	7	5	6	6	12	23	35	37	32	25
	1882.....	14	21	16	12	8	7	9	8	11	17	23	23	16
	In 1882 Greater than Av. 1877-82.	=	9	6	5	2	1	3	=	=	=	=	=	=
	In 1882 Less than Av. 1877-82.	=	=	=	=	=	=	=	4	6	2	=	2	=
MEASLES.	Av. 6 yrs., 1877-82.	13	10	13	16	23	28	23	16	8	5	4	6	8
	1881.....	26	19	30	39	61	62	44	26	16	8	5	3	3
	1882.....	11	10	11	15	13	21	21	17	6	3	4	7	10
	In 1882 Greater than Av. 1877-82.	=	=	=	=	=	=	1	=	=	=	1	2	=
	In 1882 Less than Av. 1877-82.	2	=	2	1	10	7	2	=	2	=	=	=	=
		CHOLERA INFANTUM.												
		Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
		13	1	1	2	1	2	11	34	51	37	13	4	1
		18	0	1	1	0	3	17	51	69	51	18	4	1
		12	1	1	2	1	2	9	17	41	40	20	5	1
		=	=	=	=	=	=	=	=	=	=	=	=	=
		1	=	=	=	=	=	2	17	10	=	=	=	=
		=	=	=	=	=	=	=	=	=	=	=	=	=
		=	=	=	=	=	=	=	=	=	=	=	=	=
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		=	=	=	=	=	=	=	=	=	=	=	=	=
		=	=	=	=	=	=							

* Other statements for 1882 and months in 1882, relative to these diseases are given in Table 2, pages 206–217, and in Exhibits 55, 57, 58, and 59, pages 238, 242, 244, and 245, where are also given for convenient comparison statements of coincident meteorological conditions. The lines for 1882 are graphically represented in Diagrams 1, page 200, 3, page 240, and 4, page 234.

EXHIBIT 57.—INTERMITTENT FEVER AND REMITTENT FEVER.—*Stating, for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports of Diseases Stated Presence of Intermittent Fever, also of Remittent Fever, and what were the Meteorological Conditions, as observed at Stations in Michigan.**

INTERMITTENT FEVER.										TEMPERATURE, F.		HUMIDITY OF AIR, §		VAPOR INHAL'D and EXHALED, from Air Passages, by one Person in 24 Hours.		OZONE,—Relative, Scale of 10°.		Miles per Hour, by Anemometer.		ATMOSPHERIC PRESSURE. Inches. Reduced to 32° Fahr.	
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS STATING PRESENCE OF.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present, †, ‡	Av. Daily Range, by Registering Thermometers.		Average of Three Daily Observations.	Relative, Per Cent of Saturation.	Absolute,—Grs. of Vapor in a Cubic Foot of Air.	Inhaled, ||		Exhaled in Excess of that Inhaled, ¶	Av. Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour, by Anemometer.	RANGE.		Monthly and for Year.	Av. Daily, by 3 Daily Observations, ††	Average Pressure.		
			Av. Daily Range, by Registering Thermometers.	Average of Three Daily Observations.				Inhaled, ||	Exhaled in Excess of that Inhaled, ¶						Monthly and for Year.	Av. Daily, by 3 Daily Observations, ††					
More than Av. Per Ct. of Intermittent Fever.	Sept..	82	1.8	19.31	61.70	b 77	5.03	3.14	8.54	44	2.88	2.40	7.5	a .757	a .148	29.202					
	Oct...	80	1.7	19.77	53.53	b 76	3.95	2.47	9.21	51	3.13	2.72	8.6	a .767	a .200	a29.134					
	Aug..	80	1.6	a16.80	69.05	b 81	6.47	4.04	7.64	58	3.19	2.64	6.9	a .525	a .095	a29.112					
	July..	77	1.7	20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	a .573	a .123	a29.118					
	June..	76	1.7	20.33	64.43	71	5.20	3.25	8.43	53	b 3.47	3.34	8.7	a .794	a .163	a29.001					
	May..	76	2.1	19.55	51.04	67	a 3.30	2.06	9.62	56	b 3.79	b 3.99	b 10.1	a .810	a .158	a29.123					
Average ..	71	2.0	17.43	c47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138						
Less than Av. Per Ct. of Intermittent Fever.	Nov...	69	1.9	13.51	37.90	79	2.46	1.54	10.14	75	b 2.95	b 3.14	b 8.6	a .915	.189	a29.224					
	Apr...	68	2.5	a19.08	42.65	b 68	2.59	1.62	10.06	b 54	3.85	3.99	11.1	a1.053	.192	a29.153					
	Mar...	65	2.7	15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	a1.292	a .362	a29.149					
	Dec...	61	2.4	12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	a .997	a .225	29.135					
	Feb...	60	2.9	16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	a1.346	a .330	29.121					
	Jan...	59	2.8	15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	a1.151	a .338	a29.186					
REMITTENT FEVER.																					
More than Av. Per Ct. of Remitt. Fev.	Sept..	61	3.3	19.31	61.70	b 77	5.03	3.14	8.54	44	2.88	2.40	7.5	a .757	a .148	29.202					
	Oct...	60	2.8	19.77	53.53	b 76	3.95	2.47	9.21	51	3.13	2.72	8.6	a .767	a .200	a29.134					
	Aug...	55	3.5	a16.80	69.05	b 81	6.47	4.04	7.64	58	3.19	2.64	6.9	a .525	a .095	a29.112					
	Nov...	51	2.9	a13.51	a37.90	b 79	a 2.46	1.54	10.14	b 75	2.95	3.14	8.6	a .915	a .189	29.224					
	May..	49	3.4	19.55	51.04	67	a 3.30	2.06	9.62	56	b 3.79	b 3.99	b 10.1	a .810	a .158	a29.123					
	Average ..	48	3.3	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138					
Less than Av. Per Ct. of Remittent Fever.	July..	47	3.1	a20.25	a67.84	b 70	a 5.52	3.45	8.23	b 44	b 2.94	b 2.67	b 8.5	.573	.123	29.118					
	Jan...	48	3.6	15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	a1.151	a .338	a29.186					
	Apr...	44	3.4	a19.08	42.65	b 68	2.59	1.62	10.06	b 54	3.85	3.99	11.1	a1.053	.192	a29.153					
	June..	44	3.2	a20.33	a64.43	b 71	a 5.20	3.25	8.43	b 53	3.47	b 3.34	b 8.7	.794	.163	29.001					
	Dec...	42	3.3	12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	a .997	a .225	29.135					
	Feb...	39	3.7	16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	a1.346	a .330	29.121					
	Mar...	38	3.7	15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	a1.292	a .362	a29.149					

*. †, ‡, §, ||, ¶. ** See foot-notes with these marks in Exhibit 46, page 224.
 Proposition 1, relating to intermittent fever or remittent fever, on page 239.
 Proposition 2, relating to intermittent fever or remittent fever, on page 239.
 a Exceptions to
 b Exceptions to
 c As regards
 average temperature, there is, for 1882, no exception to Proposition 1, relating to intermittent fever, on page 239. Statements relating to these diseases for the years 1877-82 are given in Exhibit 56, page 241.

a less per cent of the reports than the average for the corresponding month in the six years 1877-82. By the first page of Table 1, page 203, it appears also that they were reported by a less proportion of observers in 1882 than in any of the preceding five years. Intermittent fever is usually most prevalent from May to October. The greatest decrease in intermittent fever in 1882 compared with the average for the six years 1877-82 was from April to August, inclusive. The temperature in those months (April to September, inclusive) was lower in 1882 than the average for the six years 1877-82, as shown on page 132.

In preceding Reports attention has been called to the close relation which intermittent fever bears to daily fluctuations in temperature of the atmosphere. By Exhibit 19, page 138, it may be seen that although the stations are not the same for every year, the average daily range of temperature appears to have been less in eight of the twelve months in 1882 than the averages for corresponding months for the four years 1879-82. By Exhibit 20, page 138, it may be seen that at the Agricultural College, near Lansing, the average daily range of temperature was less in ten months in 1882, than the averages for those months for the eight years 1874-81. In five of the six months in 1882 in which more reports of intermittent fever than for the average month in that year were received the average daily range of the temperature was greater than the average month in that year; and in five of the six months in which less than the average of intermittent fever was reported the average daily range of temperature was less than the average for the year, as appears by Exhibit 57, page 242.

Without exception in 1882 the months in which more than the average (for the year) of intermittent fever was reported were the months in which the mean temperature was above the average for the year. With but one exception (May) they were the months in which the humidity of the atmosphere was greater than the average for the year. With but two exceptions (May and November) they were the months in which the average velocity of the wind was less than the average for the year. Without exception they were the months in which the monthly range of atmospheric pressure and the mean atmospheric pressure were less than the average for the year; they were also, with two exceptions (April and November), the months in which the mean daily range of atmospheric pressure was less than the average for the year.

TYPHOID AND TYPHO-MALARIAL FEVER.

By Exhibit 56, page 241, relating to sickness from typhoid and typho-malarial fevers by months in the years 1877-82, it may be seen that the variations of these diseases in 1882 from the monthly averages for the entire period correspond very closely with each other, both having been reported on a greater than the average proportion of the weekly card-reports from January to May inclusive, and on a less proportion in Aug., Sept., Oct., and Dec. A study of the reported sickness from these diseases in connection with coincident weather by months in 1882, is given in Exhibit 58, page 244.

MEASLES AND WHOOPING-COUGH.

By Exhibit 56, page 241, it appears that on an average for the six years 1877-82 measles prevailed considerably more in the first half, or in the first seven months, of the year. Whether the hot weather of summer is unfavorable to the contagium of measles, or whether the decreased prevalence is due to the fact that children live more in the open air in summer, does not appear.

Exhibit 56 also shows for whooping-cough, on an average for the same six years, a nearly uniform prevalence in different parts of the year. Both measles and whooping-cough are also treated in Exhibit 59, page 245.

EXHIBIT 58.—TYPHOID FEVER AND TYPHO-MALARIAL FEVER.—*Stating for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports of Diseases Stated Presence of Typhoid Fever, also of Typho-malarial Fever, and what were the Meteorological Conditions, as Observed at Stations in Michigan.**

TYPHOID FEVER.				TEMPERATURE, F.		HUMIDITY of Air. §		VAPOR Inhal'd and Exhaled, from Air Passages by one Person in 24 Hours.		OZONE, — Relative, Scale of 10°		ATMOSPHERIC PRESSURE. Inches. Reduced to 32° Fahr.			
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS STATING PRESENCE OF. †	Per Cent of Weekly Reports Stating Presence of. †	Av. Order of Prevalence where Present. †, ‡	Av. Daily Range, by Registering Thermometers.	Average of Three Daily Observations.	Relative, Per Cent of Saturation.	Absolute, — Grs. of Vapor in a Cubic Foot of Air.	Inhaled. ||		Av. Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour, by Anemometer.	RANGE.		
							Exhaled in Excess of that Inhaled. ¶	Monthly and for Year.					Av. Daily, by 3 Daily Observations. **	Average Pressure.	
More than Av. Per Cent. of Typhoid Fever.															
Oct...	23	5.3	19.77	53.53	b 76	b 3.95	2.47	9.21	51	3.13	2.72	8.6	α .767	α .200	α 29.134
Nov...	23	4.9	α 13.51	α 37.90	b 79	α 2.46	1.54	10.14	b 75	2.95	3.14	8.6	α .915	α .189	29.224
Jan...	21	4.1	α 15.70	α 24.32	b 81	α 1.53	.96	10.72	b 72	b 3.68	b 4.16	b 11.5	1.151	.338	29.186
Sept...	17	6.0	19.31	61.70	b 77	5.03	3.14	8.54	44	2.88	2.40	7.5	α .757	α .148	29.202
Dec...	16	4.5	α 12.43	α 25.72	b 82	α 1.59	.99	10.69	b 85	b 3.51	b 4.08	b 10.1	.997	.225	α 29.135
Feb...	16	4.5	α 16.52	α 33.42	b 77	α 2.03	1.27	10.41	b 62	b 3.75	b 4.20	b 11.7	1.346	.330	α 29.121
Average ...	14	5.1	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138
Less than Av. Per Cent. of Typhoid Fever.															
Mar...	12	5.6	15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	α 1.292	α .362	α 29.149
Aug...	11	5.6	16.80	α 69.05	81	α 6.47	4.04	7.64	b 58	b 3.19	b 2.64	b 6.9	.525	.095	29.112
June...	9	4.6	α 20.33	α 64.43	b 71	α 5.20	3.25	8.43	b 53	3.47	b 3.34	b 8.7	.794	.163	29.001
July...	8	6.4	α 20.25	α 67.84	b 70	α 5.52	3.45	8.23	b 44	b 2.94	b 2.67	b 8.5	.573	.123	29.118
April...	8	5.4	α 19.08	42.65	b 68	2.59	1.62	10.06	b 54	3.85	3.99	11.1	α 1.053	.192	α 29.153
May...	7	5.6	α 19.55	α 51.04	b 67	3.30	2.06	9.62	b 56	3.79	3.99	10.1	.810	.158	29.123
TYPHO-MAL. FEVER.															
More than Av. Per Cent of.															
Oct...	47	4.2	19.77	53.53	b 76	3.95	2.47	9.21	51	3.13	2.72	8.6	α .767	α .200	α 29.134
Sept...	40	4.3	19.31	61.70	b 77	5.03	3.14	8.54	44	2.88	2.40	7.5	α .757	α .148	29.202
Nov...	37	4.5	α 13.51	α 37.90	b 79	α 2.46	1.54	10.14	b 75	2.95	3.14	8.6	α .915	α .189	29.224
Jan...	26	4.7	α 15.70	α 24.32	b 81	α 1.53	.96	10.72	b 72	b 3.68	b 4.16	b 11.5	1.151	.338	29.186
Average ...	24	4.9	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138
Less than Av. Per Cent of Typho-mal. Fever.															
Dec...	23	4.6	12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	α .997	α .225	29.135
Feb...	23	5.3	16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	α 1.346	α .330	29.121
Aug...	21	4.8	16.80	α 69.05	81	α 6.47	4.04	7.64	b 58	b 3.19	b 2.64	b 6.9	.525	.095	29.112
Mar...	19	5.8	15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	α 1.292	α .362	α 29.149
April...	18	5.4	α 19.08	42.65	b 68	2.59	1.62	10.06	b 54	3.85	3.99	11.1	α 1.053	.192	α 29.153
May...	15	5.9	α 19.55	α 51.04	b 67	3.30	2.06	9.62	b 56	3.79	3.99	10.1	.810	.158	29.123
July...	14	5.9	α 20.25	α 67.84	b 70	α 5.52	3.45	8.23	b 44	b 2.94	b 2.67	b 8.5	.573	.123	29.118
June...	13	6.4	α 20.33	α 64.43	b 71	α 5.20	3.25	8.43	b 53	3.47	b 3.34	b 8.7	.794	.163	29.001

* †, ‡, §, ||, ¶, **. See foot-notes with these marks in Exhibit 46, page 224.
 Proposition 1, relating to typhoid fever or typho-malarial fever, on page 239.
 Proposition 2, relating to typhoid fever and typho-malarial fever, on page 239. Statements relating to these diseases for the years 1877-82, are given in Exhibit 56, page 241.

α Exceptions to

b Exceptions to

EXHIBIT 59.—MEASLES AND WHOOPING-COUGH.—*Stating for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports of Diseases Stated Presence of Measles, also of Whooping-cough, and what were the Meteorological Conditions, as observed at Stations in Michigan.**

MEASLES.				TEMPERATURE, F.		HUMIDITY of Air. § Av. of 3 Daily Ob- servations.		VAPOR Inhal'd and Exhaled, from Air Passages, by one Person in 24 Hours.		OZONE.— Relative, Scale of 10°.		Av. Velocity of Wind, Miles Per Hour, by Anemometer.	ATMOSPHERIC PRESSURE. Inches Reduced to 32° Fahr.			
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS OF WHOOPING-COUGH.	Per Cent of Weekly Re- ports Stating Presence of Measles.	Av. Order of Prevalence where Present. †, ‡	Av. Daily Range, by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative, Per Cent of Saturation.	Absolute.—Grs. of Vapor in a Cubic Foot of Air.	Inhaled. ||	Exhaled in Ex- cess of that Inhaled. ¶	Av. Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Monthly and for Year.	RANGE.		Average Pressure.
														Av. Daily, by 3 Daily Obser- vations. **		
More than Av. Per Cent of Measles.																
June..	21	4.3	20.33	64.43	71	5.20	3.25	8.43	53	b 3.47	3.34	8.7	a .794	a .163	a29.001	
May..	21	4.5	19.55	51.04	67	a 3.30	2.06	9.62	56	b 3.79	b 3.99	b 10.1	a .810	a .158	a29.123	
July..	17	4.0	20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	a .573	a .123	a29.118	
Mar..	15	5.0	a15.89	a34.12	b 77	a 2.06	1.29	10.39	b 71	b 3.74	b 4.61	b 11.8	1.292	.362	29.149	
Apr..	13	5.0	19.08	a42.65	68	a 2.59	1.62	10.06	54	b 3.85	b 3.99	b 11.1	1.053	a .192	29.153	
Average..	11	4.9	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138	
Less than Av. Per Cent of Measles.																
Feb..	11	5.2	16.52	33.42	77	2.03	1.27	10.41	62	3.75	4.20	11.7	a1.346	a .330	29.121	
Jan..	10	4.4	15.70	24.32	81	1.53	.96	10.72	72	3.68	4.16	11.5	a1.151	a .338	a29.186	
Dec..	10	4.5	12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	a .997	a .225	29.135	
Nov..	7	6.3	13.51	37.90	79	2.46	1.54	10.14	75	b 2.95	b 3.14	b 8.6	a .915	.189	a29.224	
Aug..	6	5.3	16.80	a69.05	81	a 6.47	4.04	7.64	b 58	b 3.19	b 2.64	b 6.9	.525	.095	29.112	
Oct..	4	8.0	a19.77	a53.53	b 76	a 3.95	2.47	9.21	b 51	b 3.13	b 2.72	b 8.6	.767	.200	29.134	
Sept..	3	8.0	a19.31	a61.70	77	a 5.03	3.14	8.54	b 44	b 2.88	b 2.40	b 7.5	.757	.148	a29.202	
WHOOPING-COUGH.																
More than Av. Per Ct. of Whooping-cough.																
Sept..	20	4.2	19.31	61.70	b 77	5.03	3.14	8.54	44	2.88	2.40	7.5	a .757	a .148	29.202	
Mar..	20	4.0	a15.89	a34.12	b 77	a 2.06	1.29	10.39	b 71	b 3.74	b 4.61	b 11.8	1.292	.362	29.149	
Aug..	20	3.9	a16.80	69.05	b 81	6.47	4.04	7.64	58	3.19	2.64	6.9	a .525	a .095	a29.112	
Feb..	19	4.6	a16.52	a33.42	b 77	a 2.03	1.27	10.41	b 62	b 3.75	b 4.20	b 11.7	1.346	.330	a29.121	
July..	19	4.6	20.25	67.84	70	5.52	3.45	8.23	44	2.94	2.67	8.5	a .573	a .123	a29.118	
Jan..	18	4.7	a15.70	a24.32	b 81	a 1.53	.96	10.72	b 72	b 3.68	b 4.16	b 11.5	1.151	.338	29.186	
Average..	17	4.4	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138	
Less than Av. Per Ct. of Whooping-cough.																
Nov..	16	4.3	13.51	37.90	79	2.46	1.54	10.14	75	b 2.95	b 3.14	b 8.6	a .915	.189	a29.224	
Oct..	16	4.3	a19.77	a53.53	b 76	a 3.95	2.47	9.21	b 51	b 3.13	b 2.72	b 8.6	.767	.200	29.134	
Apr..	15	5.3	a19.08	42.65	b 68	2.59	1.62	10.06	b 54	3.85	3.99	11.1	a1.053	.192	a29.153	
June..	15	4.5	a20.33	a64.43	b 71	a 5.20	3.25	8.43	b 53	3.47	b 3.34	b 8.7	.794	.163	29.001	
May..	14	4.4	19.55	a51.04	b 67	3.30	2.06	9.62	b 56	3.79	3.99	10.1	.810	.158	29.123	
Dec..	13	5.2	12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	a .997	a .225	29.135	

*. †, ‡, §, ||, ¶, **. See foot-notes with these marks in Exhibit 46, page 224. α Exceptions to Proposition 1, relating to measles or whooping-cough, on page 239. β Exceptions to Proposition 2, relating to measles or whooping-cough, on page 239.

Statements relating to these diseases for the years 1877-82 are given in Exhibit 56, page 241.

RELATIONS OF TOTAL AMOUNT OF SICKNESS TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of such of the 26 diseases tabulated (in tables on pages 203-17) as were reported present, the average daily range of temperature, the average daily temperature, the absolute humidity of the atmosphere, the monthly and the average daily range of the barometer, and the average daily pressure of the atmosphere, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of said diseases those conditions were **less** than the average for the year. In Exhibit 62, page 248, the letter *a* marks exceptions to this proposition for the year 1882.

EXHIBIT 60.—*Summary Relative to Propositions contained in Exhibits 46, 48, 50, 51, 52, 53, etc., (pages 224-235) concerning Relations, by Months in 1882, between Greater or Less than usual Prevalence of Diseases named, and certain given coincident Climatic Conditions.*

DISEASES.	Months (inclusive) in which Diseases named were More than Usually Prevalent in 1882.	Months (inclusive) in which Diseases named were Less than Usually Prevalent in 1882.	FOR THE 12 MONTHS OF THE YEAR 1882, NUMBER OF MONTHS IN WHICH PROPOSITIONS HOLD TRUE.*										
			That in Months when Diseases nam'd were More Prevalent than usual the conditions named below were Greater than usual, and in Months when Less Prevalent than usual these conditions were less than usual.								That in Months when Diseases named were more Prevalent than usual the conditions named below were Lower than usual, and in Months when the Diseases were less Prevalent than usual these conditions were Higher than usual.		
			For Av. Daily Range of Temp.	Relative Humidity.	Av. Per Cent of Cloudiness.	OZONE.		ATMOSPHERIC PRESSURE.			Average Temperature.	Absolute Humidity.	
						Day.	Night.	Velocity of wind.	RANGE.				
									Monthly.	Average Daily.			
										Average Daily.			
Bronchitis.....	Jan. to May, Nov., Dec.....	June to Oct.....	3	7	10	10	11	11	10	9	8	11	12
Pneumonia.....	Jan. to May, Dec.....	June to Nov.....	4	7	9	11	12	12	10	10	7	10	11
Mem. Croup.....	Jan. to Mar., Oct. to Dec.....	April to Sept.....	2	9	11	7	8	8	9	10	7	10	9
Diphtheria.....	Jan. to April, Oct. to Dec.....	May to Sept.....	3	8	10	8	9	9	10	9	8	11	10
Tonsilitis.....	Jan. to April, Nov., Dec.....	May to Oct.....	2	8	11	9	10	10	11	10	9	12	11
Influenza.....	Jan. to May, Oct. to Dec.....	June to Sept.....	4	7	9	9	10	10	9	8	7	10	11
Scarlet Fever.	Jan. to April, June, Nov., Dec.	May, July to Oct.....	3	8	10	10	9	9	10	9	8	11	10
Rheumatism.....	Jan., Mar., April, June, Oct. to Dec.	Feb., May, July to Sept.....	5	6	9	8	7	7	8	8	8	9	8
Neuralgia.....	Jan., Mar. to June, Nov., Dec.....	Feb., July to Oct.....	5	5	8	10	9	9	8	7	8	9	10
Consumption, Pulmonary.	Jan. to July.....	Aug. to Dec.....	7	3	6	10	9	9	7	7	6	7	8

* The figures in each of these eleven columns show for how many months, out of the twelve months in the year 1882, the proposition named holds true; thus, for Bronchitis, the proposition was true for only three months, so far as relates to average daily range of temperature; while the proposition relative to absolute humidity holds true for all the 12 months of the year.

PROPOSITION 2.—That in months when more than the average per cent of weekly reports stated the presence of such of the 26 diseases tabulated as were reported present, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, and the average velocity of the wind were less than the average for the year; and in months when less than the average per cent of reports stated the presence of said diseases those conditions were greater than the average for the year. In Exhibit 62, page 248, the letter *b* marks exceptions to this proposition for the year 1882.

What per cent of the weekly reports received in 1882 (on an average for such of the tabulated diseases as were reported present) stated presence of the diseases, is graphically represented by months in Diagram 5, page 236.

EXHIBIT 61.—*Summary Relative to Propositions contained in Exhibits 55, 57, 58, 59, (pages 238-245), concerning Relations, by Months in 1882, between Greater or Less than Usual Prevalence of Diseases named, and certain given coincident Climatic Conditions.*

DISEASES.	Months (inclusive) in which Diseases named were More than Usually Prevalent in 1882.	Months (inclusive) in which Diseases named were Less than Usually Prevalent in 1882.	FOR THE 12 MONTHS OF THE YEAR 1882, NUMBER OF MONTHS IN WHICH PROPOSITIONS HOLD TRUE.*											
			That in Months when Diseases named were More Prevalent than Usual the conditions nam'd below were Higher than Usual, and in Months when the Diseases were Less Prevalent than Usual these conditions were Lower than Usual.						That in Months when Diseases named were More Prevalent than Usual the conditions named below were Less than Usual, and in Months when the Diseases were Less Prevalent than Usual these Conditions were Greater than Usual.					
			Av. Daily Range of Temperature.	Av. Temperature.	Absolute Humidity.	Atmospheric Pressure.			Relative Humidity.	Av. Per C ^t . of Cloud-iness.	Ozone.		Velocity of Wind.	
						Range.					Day.	Night.		
						Monthly.	Av. Daily.	Av. Daily.						
Diarrhea.....	July to Oct...	Jan. to June, Nov., Dec.	8	10	11	2	4	5	6		11	10	10	
Cholera Infan...	July to Oct...	Jan. to June, Nov., Dec.	8	10	11	2	4	5	6	9	11	10	10	
Intermit. Fever.	May to Oct....	Jan. to April, Nov., Dec.	10	12	11	0	2	3	8	11	9	10	10	
Remittent Fever	May, Aug. to Nov.	Jan. to April, June, July, Dec.	7	9	8	2	3	6	5	8	10	9	9	
Typhoid Fever..	Jan., Feb., Sept. to Dec.	Mar. to Aug...	4	4	5	7	8	7	2	3	7	6	6	
Typho-mal Fever	Jan., Sept. to Nov.	Feb. to Aug., Dec.	6	6	7	5	6	9	4	5	9	8	8	
Measles.....	Mar. to July..	Jan., Feb., Aug. to Dec.	9	7	6	5	5	6	10	8	4	5	5	
Whooping-cough	Jan. to Mar., July to Sept.	Apr. to June, Oct. to Dec.	5	6	7	6	8	7	3	5	7	6	6	

* The figures in each of these 11 columns show for how many months out of the twelve months in 1882 the proposition named over the column holds true; thus, concerning diarrhea, the proposition relative to Average Daily range of Temperature held true in eight months out of the twelve; that relative to Av. Temperature, in 10 out of 12, etc.

EXHIBIT 62.—AVERAGE DISEASE.—*Stating, for the Year and for each Month of the Year 1882, What Per Cent of the Weekly Reports of Diseases, on an Average for such of the 26 Tabulated Diseases as were Reported Present, Stated Presence of the Diseases, and what were the Meteorological Conditions, as Observed at Stations in Michigan.**

DISEASES TABULATED.				TEMPERATURE, F.		HUMIDITY of Air- Av. of 3 Daily Ob- servations.		VAPOR Inhal'd and Exhaled, from Air Passages, by one Per- son in 24 Hours.		OZONE,— Relative. Scale of 10°.		ATMOSPHERIC PRESSURE. Inches. Reduced to 32° Fahr.				
MONTHS IN ORDER OF GREATEST PER CENT OF WEEKLY REPORTS STATING PRESENCE OF.†	Per Cent of Weekly Re- ports Stating Presence of.†	Av. Order of Prevalence where Present. †, ‡	Av. Daily Range, by Reg- istering Thermometers, Average of Three Daily Observations.	Relative, Per Cent of Saturation.	Absolute—Grs. of Vapor in a Cubic Foot of Air.	Inhaled. ¶	Exhaled in Ex- cess of that Inhaled. ¶	Av. Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.		Night Observation, 9 P. M. to 7 A. M.		Av. Velocity of Wind, Miles per Hour, by Anemometer.	RANGE.		Average Pressure.
									Monthly and for Year.	Av. Daily by 3 Daily Obser- vations.*	Av. Daily by 3 Daily Obser- vations.*					
More than Av. Per Ct.	Sept.....	34	4.3	19.31	61.70	b 77	5.03	3.14	8.54	44	2.88	2.40	7.5	α .757	α .148	29.202
	Oct.....	32	4.2	19.77	53.53	b 76	3.95	2.47	9.21	51	3.13	2.72	8.6	α .767	α .200	α 29.134
	Jan.....	31	4.2	α 15.70	α 24.32	b 81	α 1.53	.96	10.72	b 72	b 3.68	b 4.16	b 11.5	1.151	.338	29.186
	Nov.....	31	4.1	α 13.51	α 37.90	b 79	α 2.46	1.54	10.14	b 75	2.95	3.14	8.6	α .915	α .189	29.224
	April....	30	4.4	19.08	α 42.65	68	α 2.59	1.62	10.06	54	b 3.85	b 3.98	b 11.1	1.053	α .192	29.153
	Feb.....	30	4.2	α 16.52	α 33.42	b 77	α 2.03	1.27	10.41	b 62	b 3.75	b 4.20	b 11.7	1.346	.330	α 29.121
Average...		30	4.2	17.43	47.14	76	3.48	2.18	9.50	61	3.41	3.50	9.6	.915	.211	29.138
Less than Av. Per Ct.	March...	30	4.3	15.89	34.12	77	2.06	1.29	10.39	71	3.74	4.61	11.8	α 1.292	α .362	α 29.149
	Aug.....	30	4.2	16.80	α 69.05	81	α 6.47	4.04	7.64	b 58	b 3.19	b 2.64	b 6.9	.525	.095	29.112
	Dec.....	29	4.0	12.43	25.72	82	1.59	.99	10.69	85	3.51	4.08	10.1	α .997	α .225	29.135
	May.....	29	4.3	α 19.55	α 51.04	b 67	3.30	2.06	9.62	b 56	3.79	3.99	10.1	.810	.158	29.123
	June....	28	4.1	α 20.33	α 64.43	b 71	α 5.20	3.25	8.43	b 53	3.47	b 3.34	b 8.7	.794	.163	29.001
	July.....	28	4.2	α 20.25	α 67.84	b 70	α 5.52	3.45	8.23	b 44	b 2.94	b 2.67	b 8.5	.573	.123	29.118

* †, ‡, ¶, §, ¶, ** See foot-notes with these marks in Exhibit 46, page 224. It should be noticed that small numbers in the "Av. Order of Prevalence" column in this exhibit indicate less rather than more sickness—reversing the rule stated in note e, on page 220, with reference to a single disease, or when one disease is compared with another.

a Exceptions to Proposition 1, on page 246.

b Exceptions to Proposition 2, on page 247.

EXHIBIT 63.—SICKNESS FROM AVERAGE DISEASE, 1877-82.—*By Year and Months for each of the Six Years 1877-82. Stating on an Average for such of the 26 diseases tabulated as were reported present, What Per Cent of the Weekly Reports Received stated Presence of the Diseases, and Comparing the Average Per Cents for Months in 1882 with the Averages for Corresponding Months in those Years.*

YEARS, ETC.	Annual Av.	MONTHS.											
		Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average 6 Years 1877-82.....	31	32	32	31	31	29	28	30	34	35	33	31	31
1877.....	28	27	28	26	24	24	23	26	29	31	30	30	30
1878.....	30	30	30	31	29	28	26	28	32	35	34	30	32
1879.....	33	35	36	36	35	30	30	32	37	36	34	34	33
1880.....	32	32	32	32	31	30	31	34	36	35	32	30	31
1881.....	33	34	34	32	35	31	30	34	37	36	35	32	31
1882.....	30	31	30	30	30	29	28	28	30	34	32	31	29
In 1882 Less than Av. 1877-82.....	1	1	2	1	1	=	=	2	4	1	1	=	2

CONTAGIOUS AND INFECTIOUS DISEASES.

BY JOHN AVERY, M. D., PRESIDENT OF THE STATE BOARD OF HEALTH,
GREENVILLE, MICHIGAN.

[Read at a Sanitary Convention held at Ionia, Mich., Dec. 13 and 14, 1883.]

The subject assigned me by your committee is Contagious and Infectious Diseases. I shall be sufficiently accurate for the purpose of a popular paper, if I say that all contagious diseases are infectious, and that all infectious diseases are contagious, and that these terms, at the present time, are regarded as interchangeable, and are used by writers upon medical subjects to denote a class of diseases having their origin in a specific poison taken into the system, and containing in itself the germs of self-propagation. Thus the germs or virus of small-pox taken into the system produce small-pox; of chicken-pox, chicken-pox; of measles, measles; of scarlet fever, scarlet fever; and of diphtheria, diphtheria. And so the poison of small-pox may be communicated directly from a person suffering from that disease, to a well one, and thus be contagious; or it may be carried in the clothing of a protected person to an unprotected one, who will have small-pox, and so be infectious. What is true of small-pox is true of other diseases of this class, and particularly so of the two diseases which the people of Michigan are most interested in preventing, namely, diphtheria and scarlet fever. We may say then, that all contagious and infectious diseases are communicable, and that all communicable diseases are preventable.

It is estimated that one-third of all the sickness and one-third of all the deaths which take place annually in the United States are from preventable causes. I think the estimate is below the truth, for it is undeniably true that very many of the diseases, besides those known to arise from specific causes and to be communicable, could be prevented with better knowledge of hygienic laws. But if one-third of the sickness in our country can be prevented, what grand opportunities open up before the sanitarian, and invite the co-operation of all who would rejoice to see sickness and suffering lessen in our midst, and the average of human life increased.

It would be unprofitable and perhaps confusing, in a paper of this kind, to point out and comment on all communicable diseases. We shall better serve the purpose of this convention if we select a few as the type of all, and concentrate our fire upon the most threatening, namely, diphtheria, scarlet fever, and small-pox, and I name these in their order of greatest danger. I might add to this list typhoid fever and puerperal fever. And recent investigations point strongly to the conclusion that that dread disease which has so long stood at

the head of our mortality tables in the United States, consumption, if not already on the list, will soon be added to it. Yet I shall confine myself in this paper to a few practical suggestions as to how communities and neighborhoods may best protect themselves against the first three named.

If a person is taken down with small-pox in any community in this State, the inquiry is at once raised, Where did he get it? implying a knowledge of the fact that it did not originate with him, but was contracted from some pre-existing case. No one supposes for a moment that the disease was contracted from exposure to cold, wet feet, hard work, or in any other way than by coming into direct contact with the poison arising from a previous case. Whether it came to him in a letter, was picked up in the cars, found on the street, in church, or the theatre, or brought to him by the rag-gatherer, or the mendicant who asked alms at his door, may never be known; but no one will ever doubt that somewhere and in some manner he had come in contact with the poison from another case. The knowledge that the case had its origin in a previous one leads the public at once to take measures to protect themselves against its further spread. They will keep away from it, isolate it, vaccinate and re-vaccinate, and take all the well-known precautions to limit it to the person or family in which it first occurred. It is true that a community long exempt from an outbreak of small-pox will sometimes become neglectful of the well-known protective influence of vaccination, but they will immediately resort to it upon the appearance of the first case in their midst. They will insist that the health authorities shall do their duty; that the case shall be thoroughly quarantined or isolated; that the house shall be placarded, and a red flag hung out by day and a red light by night; and that the road leading to the house shall be barricaded, and quite likely that a great many other unnecessary and foolish things shall be done; but all having their origin in a knowledge of the infectious and dangerous character of the disease, and a determination to protect themselves against its extension.

Now this zeal is commendable, and is the result of positive knowledge that the disease is dangerous, that it does not originate of itself, but that it is communicated from one individual to another, and that it can be limited, and in the end stamped out.

If we could impart this same positive knowledge to the people of every community in this State, and make them realize that diphtheria and scarlet fever are much more dangerous to life, just as communicable, and just as preventable, as small-pox, our mortality reports would not long compel us to record fifty deaths in this State from these two diseases to one from small-pox.

I need enter into no argument to prove the contagious character of diphtheria. That it is a communicable disease is now almost universally admitted by the medical profession, by all scientists who have made careful investigation during many epidemics in this and other countries, and by all intelligent observers who have watched its outbreak and progress from house to house in different communities. The question whether it ever originated *de novo* may very properly be remanded for settlement to those who delight in the discussion of such subjects as spontaneous generation and the origin of evil. My own individual belief is, but this I shall not stop to discuss, that each of the many communicable diseases has its own specific germ or seed, which ripens during the progress of the disease, and which, taken into a system properly prepared to receive it, will grow and multiply, and in due season bring forth fruit of its kind, and of no other kind. Whether these germs are bacteria, or some other minute organism, is not material for the purposes of this paper. What is of

much more interest to the people is the fact that they will reproduce themselves, will live for an indefinite period unless destroyed by heat or some other active agent, and will, if allowed to spread from house to house and person to person, invariably, under favoring circumstances, produce the same disease as the one from which they originated. These germs are minute particles of organic matter, probably minute living organisms, invisible to the unaided eye, very tenacious of life, will cling to the walls of the room of the sick patient, and to the books, papers, furniture, carpets, bed-clothing, and whatever is in the room. They may be carried in the hair, whiskers, and clothing of the attendants and visitors, and I fear sometimes by the attending physician. They may be carelessly thrown out in the excreta of the patient, and be carried into and poison the water-supply of the household and possibly of the neighborhood. They may be carried into the dairy or milk-closet, and be taken into the system with the cream in our morning coffee, or be fed to the children with their bread and milk. They may even pass into the water-supply from which dairymen water their cows, and increase their milk, and be peddled from house to house at six cents a quart. They may pass from one to another in the kiss of friendship or affection.

Now these are no fanciful or improbable means of carrying these germs and communicating disease. Well authenticated cases are on record where disease has been spread from one person to another by each of the different means here mentioned. And they are enumerated here for the purpose of calling attention to the ease with which these diseases are multiplied, and to the importance of destroying these germs as you would destroy a venomous serpent, a rabid dog, or anything else that threatened the health and lives of a community.

How may they be destroyed, and their distribution prevented?

Let us take a case of diphtheria for our illustration. I select this disease because it heads the list of communicable diseases in the mortuary record of the United States, and because the measures of prevention adapted to it are, with slight modification, adapted to all others of its class. The moment a case of diphtheria is recognized, that moment responsibility begins, and if it extends beyond the first case, or at most beyond the house where it occurred, somebody has been at fault, and somebody must bear the responsibility; and a fearful responsibility it is, too.

The moment the case is recognized, let the child (it is most likely a child, and the brightest one of the family, too) be put to bed in the airiest, sunniest, and best room in the house. Let every other child be kept out of that room, and if possible out of the room adjoining it; and notify the health officer at once. A room up stairs with a south and east exposure is the best. If the walls are unpapered and the floor uncarpeted, all the better. The furniture should consist of a bed, a lounge, one or two chairs, not more, and a small table or stand. I would not have a commode in it,—it will be used to conceal what should be burned at once. Let there be an abundance of pure, fresh air in the room, so abundant that not the least sense of closeness will be noticed upon entering it from out-doors. Let in the sunlight, and keep the temperature of the room as near 65° or 70° Fahr., as possible. Cut the child's hair short, and bathe frequently with warm water, two, three, or four times daily, according to the degree of heat present. Apply cosmoline, sweet oil, or fresh lard to all exposed parts of the body, such as the face, neck, and hands. Receive all discharges from the throat, mouth, and nostrils, upon pieces of paper or cloths, and immediately burn them. All discharges from the kid-

neys and bowels should be received into a vessel containing a strong solution of copperas,—one pound to the gallon of water, and be immediately covered, first with a cloth wet in the same solution, and then with the cover to the vessel, and then at once taken out-door and burned, if in the country or village; if in the city they may be emptied into the water-closet, though even here it would be safer to burn them. The vessel should be first rinsed with boiling water, then filled with it, and be kept covered and out-door until wanted again. Every child should be rigorously excluded from the room, and no direct communication allowed between the nurse, whoever she may be, and the younger members of the household, or with other children of the neighborhood. If the patient recovers it should remain apart from all other children until all traces of the disease have disappeared; and in a case of scarlet fever, until the peeling process is completed, and from ten days to two weeks afterwards. Then it should receive a thorough bath and fresh clothing throughout, when it may be allowed to mingle with other children.

The room will now need attention. All useless clothing worn or used about the patient during sickness should be burned up, and all others thoroughly disinfected by being boiled in water in which sulphate of zinc and common salt have been dissolved, one-fourth pound of each to a gallon of water. Such clothing as will not bear washing may be fumigated, together with the room and all its furniture, according to directions furnished by the State Board of Health, and published on pages 211–218, of the Report for 1881; also to be found in reprints sent out by the secretary of the Board. Then the room, furniture, and clothing, should be freely exposed to the air for several days before being used again. If the patient dies, the corpse should be thoroughly washed in the zinc and salt solution, and then closely wrapped in a sheet wet in the same solution, put at once into the coffin, which should be immediately closed, and if possible hermetically sealed. No public funeral should on any account be permitted.

Now, in very many homes in the country, villages, and cities in this State, it is possible to follow the directions and secure the conditions here described, or a near approach to them. Where they cannot be secured, the health authorities should have no more hesitation in providing a place for the proper isolation and treatment of a case of diphtheria or any other of the communicable diseases, than they would have for the treatment of a case of small-pox. In a case of small-pox the community will compel the observance of these or similar precautions. Why not in case of diphtheria, scarlet fever, and other communicable diseases, where danger to health and life are much greater than in small-pox.

I have not laid, and shall not lay much stress upon the use of disinfectants in the sick-room during the progress of the disease, only so far as I have indicated. As ordinarily used, they fall into false security, simply disguising one bad smell by substituting another. When you attempt to purify the air of a sick-room, made foul by the exhalations of the breath and of the sick, by the use of carbolic acid, chloride of lime, or any other disagreeable smelling substance, you simply add to the danger instead of lessening it. Pure air in abundance and circulating freely through the room, is the best disinfectant; nothing else can make its place. To meet nothing but the effort to open a door and a window, and sometimes a slight protection for the patient against too strong a current. This air is as necessary at night as in the day time, and is as pure. Additional warming may be required at night, but none the less air.

The precautions necessary to restrict diphtheria are applicable to all other

communicable diseases. In typhoid fever, the danger from direct contagion is probably much less than in most of the other infectious diseases, and entire isolation is perhaps not so necessary as in small-pox, diphtheria, and scarlet fever. But the same care in the disposal of all excreta must positively be enforced. They contain the germs of the disease, and the excreta from a single typhoid fever patient, if carelessly disposed of, may poison the water-supply of a hundred well persons and give them the disease.

While it may be true of all communicable diseases that each has its origin in a specific cause, it is also true that location and unsanitary surroundings have much to do in multiplying and intensifying that cause. Damp and unventilated basements, cess-pools, stagnant water near the dwelling, bad air in the living and sleeping rooms, seem to form a nidus in which the germs of these diseases grow and multiply and increase in intensity; and when they seize upon their victims in such a locality, with a system already poisoned by the surroundings, the conflict is generally short; and the danger of infection from such a case is much increased. Pure air, pure water, dry and cleanly surroundings, are safeguards that can no more be neglected in these than in other forms of disease.

I have said that all communicable diseases are preventable. They are, possibly so; practically, perhaps they are only controllable. We can, if we will, at the present time, keep them within bounds. And as the nature of their poison and its different modes of communication become better understood, we may in time be able to suppress them altogether. At present they seem to be the acute scourges of mankind, and alarm and appal us by the sudden havoc they occasion. While some of them respect neither age, sex, nor condition in life, a majority prefer to strike down the young of our land, and on that account seem to be the most unnatural of all the fatal dangers that threaten us. In years past they have been accepted as messengers of divine wrath, coming and going like the wind, no one knew where from or whither onward.

But now, thanks to the great advance in medical and sanitary sciences, we know something of their origin, more of their nature and habits, and instead of accepting and patiently submitting to them as providences to be borne, we look upon them as enemies to the peace and happiness of society, and demand their extermination.

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ERRATA.

Page 65, seventh paragraph, eleventh line, for *cultivation* read *cultivation*.

Page 117, title, for EXAMINATIONS OF PUBLIC BUILDINGS, read EXAMINATIONS OF PLANS FOR PUBLIC BUILDINGS.

Page 123, footnote a, for 70°S' west from Greenwich, read 77°S' west from Greenwich.

Page 128, SEPTEMBER, fifth paragraph, sixth line, for *sallovs* read *swallows*.

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